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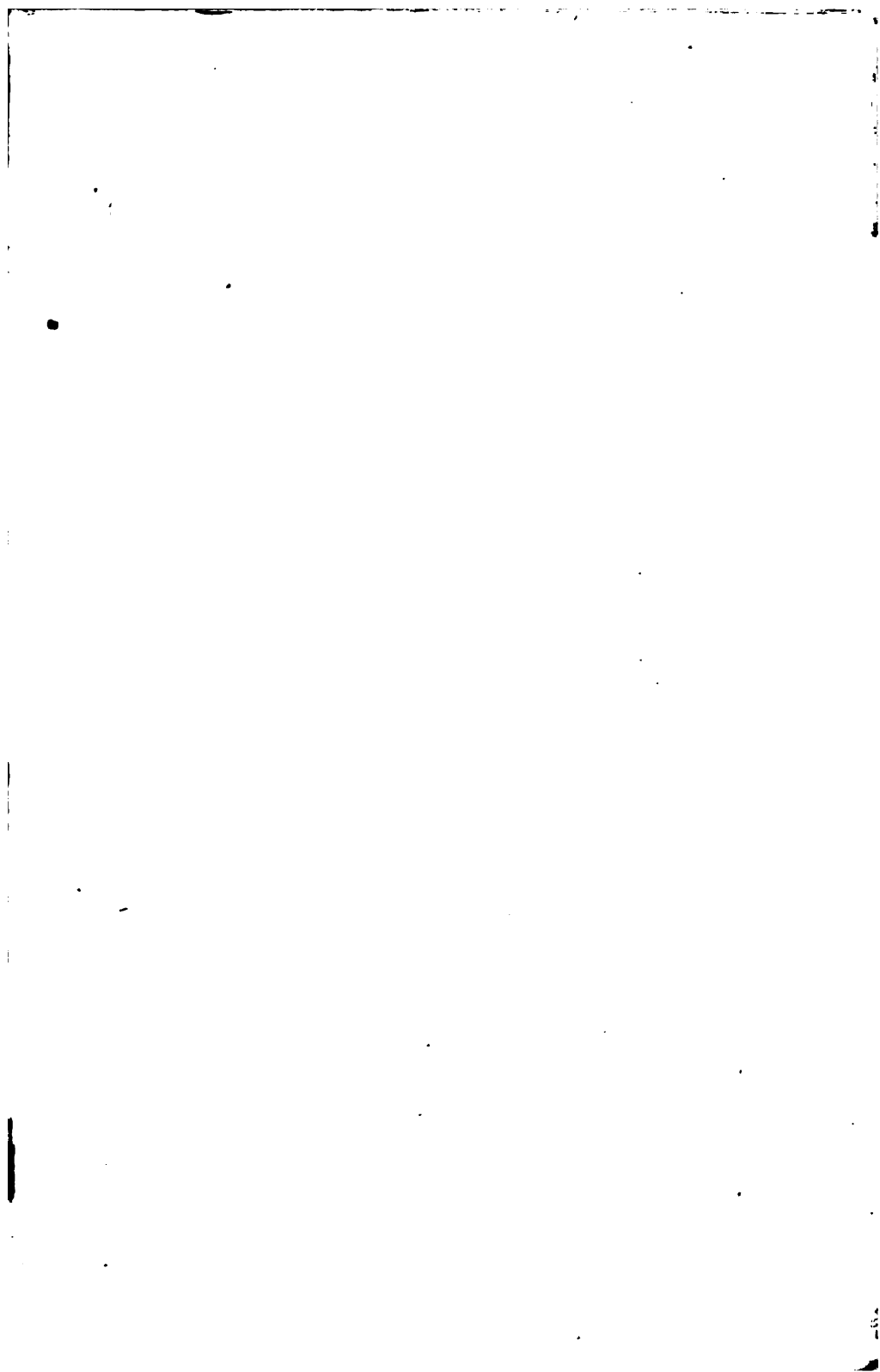
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Mr. W. NEWTON,

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(Assisted by several Scientific Gentlemen.)

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- III. Donisthorpe's Machinery for Combing Wool ; Heindryckx's Furnaces ; and Newton's Weighing Apparatus.
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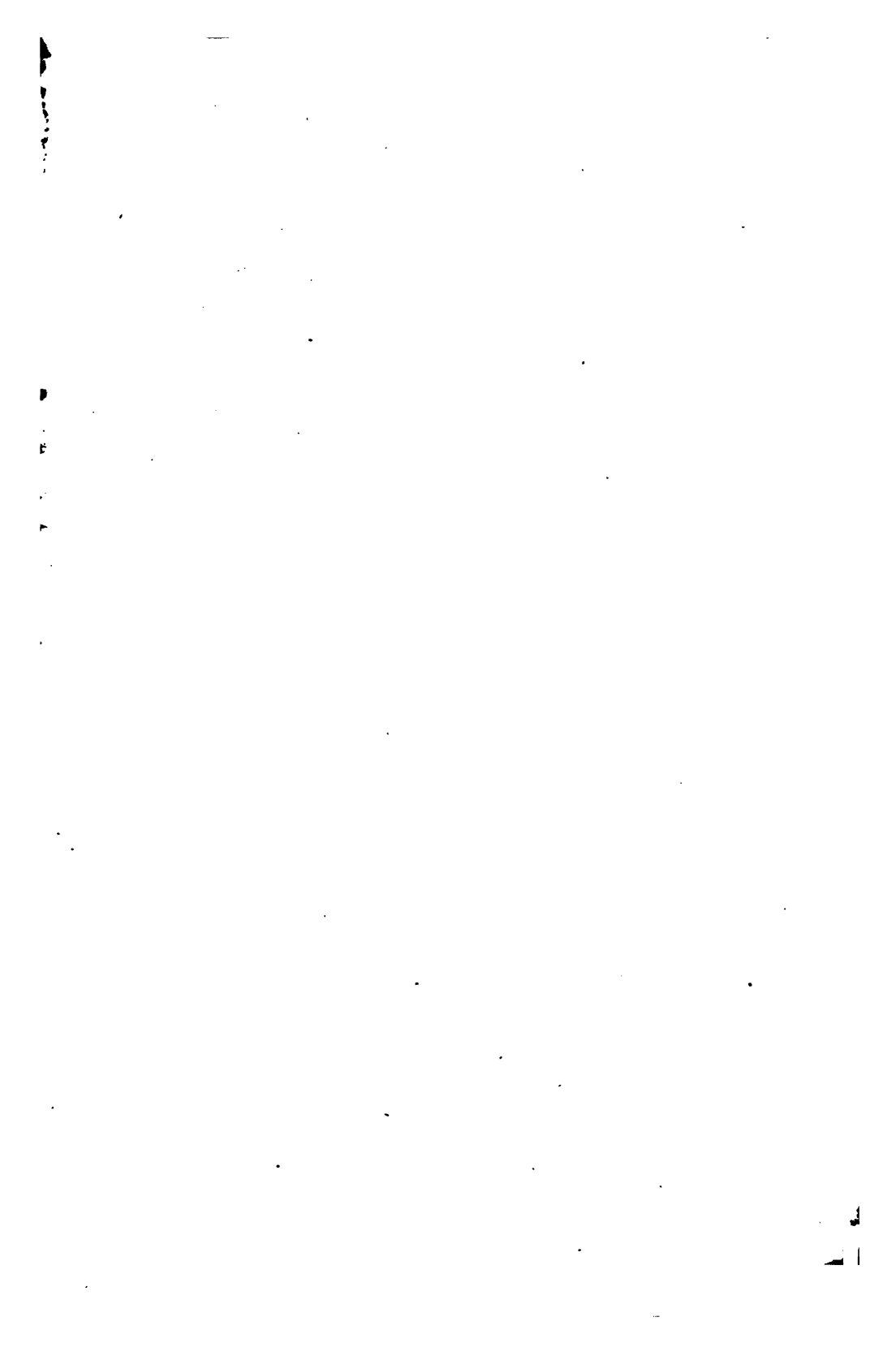
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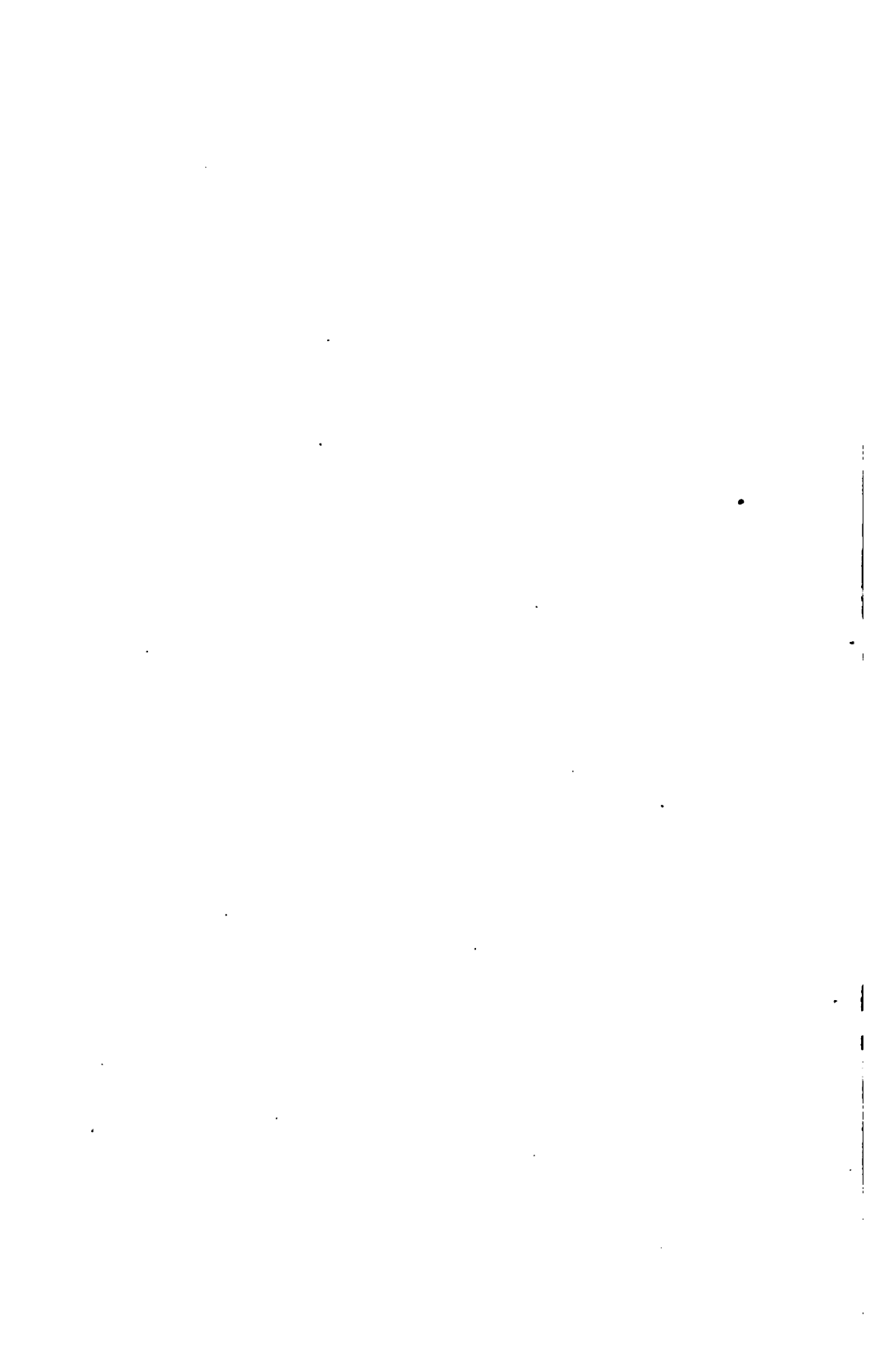
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CONJOINED SERIES.

No. CXXII.

Recent Patents.

To JOSEPH MAUDSLAY, of Lambeth, in the county of Surrey, engineer, for an improvement in the arrangement and combination of certain parts of steam-engines, to be used for steam navigation.—[Sealed 16th March, 1841.]

THIS improvement relates to the arrangement and combination of certain parts of steam-engines, of that kind or class whereof the centre of the steam-cylinder (wherein the piston works) is situated immediately beneath the rotative axis of the crank. And the particular parts of steam-engines, to which the arrangement and combination relates, are the steam-cylinder, with its bottom and cover, the piston and piston-rod, the cross-head belonging to the piston-rod, and the connecting-rod,—together with all requisite appurtenances to the several parts.

In Plate I., several views of the improved construction of engine are shewn; fig. 1, being a longitudinal vertical section; fig. 2, a horizontal plan of the upper part of the

engine; fig. 3, a horizontal section of the cylinders; and fig. 4, a transverse vertical elevation and section, representing two engines, disposed side by side, for combined action, in the manner engines usually are combined on board steam vessels,—one of the engines being represented in section, the other in elevation. *a, a*, is the steam-cylinder, its interior surface being bored truly cylindrical, as usual, for steam-cylinders; and *b, b*, is a small cylinder, fixed concentrically within the steam-cylinder *a, a*;—the external cylindrical surface of the small cylinder is turned true in a lathe, but the interior of the small cylinder does not require boring. *n, n*, is the bottom of the steam-cylinder, to which the flange, around the lower part of the steam-cylinder *a, a*, is fitted, as usual, with a close joint; and the small cylinder *b, b*, is also fitted to the same bottom, with an internal flange at its lower end, so as to be truly concentric with the interior of the cylinder *a, a*, in order that an annular cylindrical space may be left between the two cylinders, of exactly equal breadth all round; *m, m*, is the cylinder-cover, made so as to leave the small cylinder *b*, open, and is bolted to the exterior flange around the top of the cylinder; *c, c*, is the annular piston, fitted into the cylindrical space between the two cylinders; *d, d*, are two piston-rods, passing through stuffing-boxes, and are fixed to the annular piston, at two points, as shewn in figs. 1 and 3. The upper ends of these rods are securely fastened to the upper extremities of a T-shaped cross-head *e, e, f, f*, composed of two parallel sides, united together at the extremities of the upper horizontal part, and also united at the lower extremity of the upright stem *f, f*, by the joint-pin *s*, at the lower end of the connecting-rod *g*; a space sufficient being left between these extremities to allow the connecting-rod *g*, to work therein, as shewn in figs. 2, 3, and 4.

The upper end of the connecting-rod *g*, is fitted with a similar joint, upon the crank-pin of the crank *h*, in the usual manner; *p, p*, (figs. 1 and 3,) are the two sliding pieces, at the lower ends of the upright stems *f, f*.—These sliding pieces are fastened to both the stems *f, f*, as shewn in fig. 3, and form, as it were, a sort of box, within which the joint, at the lower end of the connecting-rod *g*, is enclosed, but without touching the interior of such box.

The two sliding pieces *p, p*, move up and down in angular grooves, formed in the two upright edges *r, r*, fixed withinside of the interior of the small cylinder *b, b*, at opposite sides of the circumference of that interior, so as to constitute a parallel vertical guiding groove.

The two ends of the joint-pin *s*, are reduced to small joint-pins, which project out on each side, beyond the sides *f*, of the T-shaped cross-head; and on these pins are fitted the lower ends of two links *j, j*, for working the air-pump, their upper ends being united to the long ends of two levers *k, k*, situated one on each side of the cross-head *e, e*; and from the opposite or short ends of these levers, the rod *l*, of the air-pump *s*, is suspended by two suitable links, both of which are jointed thereto. The fulcrum *t*, of the levers *k, k*, is common to both levers, and is sustained by suitable framing.

The horizontal axes *i, i, i*, of the cranks *h*, are the same as usual in marine steam-engines. The several bearings for the axes are sustained in one horizontal line, in a framing of iron, affixed between two parallel wooden beams, extending, horizontally, across the vessel, from side to side thereof; and the iron framing is upheld by four upright props of wrought-iron, firmly attached to the base, whereon the cylinder *a, a*, stands.

This base is made to serve for the condenser, being continued out from beneath the cylinder, in order to admit the

air-pump *s*, to be placed in it. The air-pump, with its bucket and valves, and the hot well, also the hot-water pump, may be constructed in the ordinary manner. The base or condenser also has a lateral branch, projecting out from beneath the cylinder, to receive the lower end of the sliding valve, by which the steam is distributed to the cylinder; and the branch serves as the eduction passage for exhausting the steam from the cylinder, and conveying it down into the condenser. The upper surface of the base or condenser serves as the bottom *n, n*, of the steam-cylinder *a, a*; and a lateral passage *y*, may be formed within it, to lead beneath the open space within the small cylinder *b, b*, and give access to the joint at the lower end of the connecting-rod, as already mentioned.

The sliding valve, for distributing the steam to the cylinder, as represented in the drawing, is what is called a D sliding-pipe valve, of the same kind as is most commonly used in marine steam-engines, but any other kind of distributing-valve or valves may be used.

The patentee claims the arrangement and combination of the parts (hereinbefore mentioned) of steam-engines, to be used for steam navigation, the distinguishing character of that improvement being, that the connecting-rod, with the requisite appurtenances of that rod, as hereinbefore enumerated, is situated and works within a space, which is left vacant for the reception of these parts, within the interior of the small open-topped cylinder, which is fixed in the central part of the steam-cylinder, and within the central part of the annular piston, which works up and down in the annular cylindrical space left between the interior of the steam-cylinder and the exterior of the small cylinder, as described.—[*Inrolled in the Rolls Chapel Office, September, 1841.*]

To JOSHUA FIELD, of Lambeth, in the county of Surrey, engineer, for an improved mode of effecting the operation of connecting and disconnecting from steam-engines, the paddle-wheels used in steam navigation.—
 [Sealed 22nd March, 1841.]

THIS improved mode of effecting the operation of connecting and disconnecting paddle-wheels, consists in giving an end-way horizontal motion to the paddle-wheel shaft or horizontal axis, whereon the paddle-wheel is mounted. The method by which this is effected, will be seen by reference to the figures in Plate I.

Fig. 1, is a longitudinal vertical section, taken across the direction of the axis of the paddle-wheel; fig. 2, a transverse vertical section, taken in the direction of the length of the said axis; and fig. 3, is a horizontal plan. A, is the axis of the paddle-wheel, and B, the paddle-wheel crank, on the end of that axis; C, is the iron framing, to sustain the neck of the axis A; and *b*, is the lower brass of the bearing, whereon the neck *a*, of that axis rests and revolves; D, is the engine-crank, and E, the axis thereof; F, the iron framing to sustain it; *f*, is the lower brass, and *g*, the upper brass of the bearing, wherein the neck of the axis E, revolves; G, is the cap or upper part of the bearing, which keeps the brass *g*, in its place; H, *h*, is the crank-pin, fastened firmly into the engine-crank D, and projecting out, horizontally, therefrom; H, is the part whereon the joint of the connecting-rod is fitted; and *h*, the protruding extremity of the pin, which enters into a hole in the end of the paddle-wheel crank B, as shewn in fig. 2.

It will be seen, by reference to this figure, that the neck *a*, of the axis A, of the paddle-wheel crank B, is longer than the brass *b*, of the bearing, which is to allow the axis

A, to be moved endways in the bearing, as much as will remove the paddle-wheel crank B, to the position represented by the dotted lines *x*, when the disconnection of the paddle-wheels is effected.

The mechanism, for moving the axis endways, is shewn applied in the cap 1, in the following manner:—The upper brass *d*, of the bearing, is fitted into the cap 1, so as to be capable of sliding, horizontally therein, in the direction of the length of the axis; this brass occupies the whole length of the neck *a*, of the axis A, so as to fill up between the shoulders of that neck, although the lower brass *b*, of the same bearing, is, as before mentioned, shorter than the neck *a*.

The brass *b*, is fixed in its bearing *c*, without liberty of moving or sliding therein; and, in order to move or slide the brass *d*, in its cap 1, an excentric circle *k*, is applied in the space between the top of the brass *d*, and the under side of the cap 1. The excentric *k*, is attached to an upright axis *l*, which passes down through a vertical socket *m*, formed on the top of the cap 1; and on the upper end of the axis *l*, a toothed wheel *i*, is fixed, in order to turn the axis, and, consequently, the excentric *k*, round. The excentric *k*, is enclosed within a recess, formed in the brass *d*; and the circumference of the excentric touches the two sides of that recess, which are horizontal straight edges, parallel one to the other; so that being turned round, or half round, it will, by acting between the parallel edges, move or slide the brass *d*, endways within the cap 1, and thereby the axis A, of the paddle-wheels, together with the paddle-wheel crank B.

The excentric circle *k*, is shewn in the section, fig. 2, and by dotted lines in the plan, fig. 3, with the excentricity thereof turned towards the cranks.

The upright axis *l*, may be turned round by means of

the toothed wheel *i*, having its teeth engaged by the worm or endless screw *p*, on the axis *n*, to which is attached the handle *o*.

In order more effectually to secure the axis *A*, as it has been placed, whether connected or disconnected, two pawles or stops, mounted on horizontal centre pins *t. t.*, are applied in such a manner, that when the cranks are connected, the two pawles *r, r*, will fit into notches in the brass *d*, as shewn by the dotted lines in figs. 1 and 3, and thereby prevent the possibility of the axis *A*, sliding or moving outwards, and becoming disconnected from the engine; the two pawles *s, s*, being at that time out of action, and removed from the brass *d*, as shewn in figs. 1 and 3.

Before disconnecting the paddle-wheel from the engine, the two pawles *r, r*, must be removed from the notches in the brass *d*; and after the operation of disconnecting has been performed, and the brass *d*, moved into the position shewn by the dotted lines in fig. 2, the two pawles *s, s*, are to be turned up and allowed to enter into notches in the other end of the brass *d*, and thereby prevent the possibility of the axis *A*, sliding or moving inwards, and becoming connected with the engine.

When the paddle-wheel is required to be connected, it must be turned round, until the crank *B*, is brought round to stand exactly opposite to the engine-crank *D*, so that the protruding extremity *h*, of the crank-pin will be exactly opposite to the hole in the engine-crank *B*, which is to receive that extremity; and whilst the cranks are kept steadily so placed, the handle *o*, must be turned, in order to move the axis of the paddle-wheel endways, and effect the connecting; but, for the convenience of turning the paddle-wheel round, when it is disconnected, and of keeping the wheel steady, after it has been properly placed, and until it is connected, one of the circular rims of the paddle-

wheel may have teeth, formed around its circumference; and a long pinion or pinions may be mounted in a frame, so that they can be applied to engage with those teeth when required, the pinions having winch handles, by which they may be turned round by men, in order to bring the paddle-wheel to its proper position.

The patentee claims the mode described of moving the axis of the paddle-wheel endways, in the direction of its length, by means of suitable mechanism, so that the paddle-wheel crank may be brought towards or removed away from the extremity of the crank-pin of the engine-crank, with as much motion as is requisite, in order to effect the operation of connecting and disconnecting the paddle-wheel from the engines.—[*Inrolled at the Rolls Chapel Office, September, 1841.*]

To WILLIAM NEWTON, of the Office for Patents, Chancery-lane, in the county of Middlesex, civil engineer, for an invention of certain improvements in the rigging of ships and other navigable vessels,—being a communication.—[Sealed 31st December, 1840.]

THESE improvements in the rigging of ships and other navigable vessels, consist in the adaptation of a peculiar construction of lever, in connection with a sliding rack-bar or a ladder-chain; by the action of which agents, the shrouds and other parts of the rigging of ships may be tightened, the windlass worked, and heavy bodies raised or moved.

This lever is a long bar, having teeth or indentations cut in the lower end. It has an aperture or curved slot or eye made through it, of a kidney shape; which aperture re-

ceives a cylindrical fulcrum, bolt, or stationary axle, whereon the lever is to work.

The indented sliding bar has a ring or link attached to its end; which link is to be connected to the shroud or chain required to be drawn up or tightened.

In Plate I., fig. 1, is a side view (partly in section) of the frame or box, and its sheath, wherein the rack or indented bar slides. To the end of this box is attached the ring or link intended to be connected to the holdfast or staple to which the shroud is to be secured.

Fig. 2, represents the apparatus in side elevation, complete, a small portion of the box being in section. A, is the frame and sheath, formed as a rectangular box of iron, or other suitable metal, in which the rack-bar E, slides. The box A, has a flap or door B, on its upper side, rising upon a hinge-joint; which, when open, allows the lever D, to be introduced. A moveable cylindrical bolt or pin C, is passed through circular apertures in the sides of the box, and keyed in that situation; which bolt, when so fixed in the box, constitutes the fulcrum whereon the lever D, works. This bolt C, has a flat projecting head at one end, and at the other a slot, for the key to pass through, which key may be attached by a chain for convenience.

In applying this apparatus, the link or ring G, of the box A, is first to be attached to the stationary holdfast by which the shroud is intended to be secured. The end of the shroud is made fast to the ring H, of the sliding bar E, and then that bar is passed into the box A, the lid B, being thrown open. A dog or pawle F, hanging upon a pin E, fixed in the box, drops into the teeth or rack of the sliding bar, and prevents its retrogression, the pawle being pressed downwards by a feather spring A. The lever D, is now to be introduced into the box, as shewn in fig. 2, and the bolt C, passed through the sides of the box and through the eye

of the curved slot of the lever. The bolt is then to be keyed at its outer end, to confine it in the box securely.

On pushing the lever *D*, forward, it will rise, and its teeth *c, c, c*, be drawn up out of the teeth of the sliding bar *E*, the fulcrum-pin *c*, then occupying the lower part of the kidney-shaped slot, as shewn by dots; but on drawing the lever backward, it will fall, and the fulcrum-pin *c*, will then occupy the upper part of the kidney-shaped slot, the toothed part of the lever being, by that means, lowered down into the rack of the sliding bar. In this situation of the lever, the force applied to it will cause the teeth *c, c, c*, at the end of the lever, taking into the rack, to force the sliding bar *E*, forward into the sheath, and thereby draw up the shroud; the advanced position of the slider being held fast by the pawle *F*, dropping into its teeth.—Moving the lever forward again, will, as before, cause its teeth to be raised out of the rack of the sliding bar, and allow the lever to pass without acting in the rack; but, on drawing the lever back, as before, its teeth will again act in the teeth of the rack, and force the bar *E*, onward,—its advanced position, after every operation of the lever, being retained by the dog or pawle *F*.

Thus, by a succession of alternating strokes of the lever *D*, the rack-bar *E*, will be slidden forward into the sheath *A*, and the shroud, attached to the link *H*, be thereby drawn into tension.

The same construction of lever may be employed in connection with a toothed wheel, attached to the end of a revolving barrel, instead of the sliding rack-bar.

Fig. 3, represents this modification of the invention. *D*, is the lever, as before; *c*, the fulcrum-pin or bolt, fixed in a suitable framing; which bolt passes through the kidney-formed slot or eye of the lever; *I*, is a toothed wheel, made fast upon the end or axle of a windlass or barrel, round

the periphery of which, a chain or rope is to be coiled. By drawing back the lever, its teeth will take into the teeth of the wheel 1, and force it round, and with it the barrel, to which the chain or rope, intended to be drawn up into tension, is connected. The barrel or windlass of course must be furnished with pawles, as usual, to hold it, and prevent its retrograde movement, when the lever is moved in the opposite direction and raised out of the teeth.

Another modification of this invention consists, in the adaptation of a ladder-chain in place of the rack-bar, first described, in which the toothed end of the lever is made to act upon the barrels of the several links, as cogs or teeth. This contrivance affords a more extended drawing action than the sliding rack-bar.

Fig. 4, is a side view of the apparatus; A, is a section of the box, constructed as in fig. 1, but without the hollow sheath. The ring or link G, is attached to the hinder part of the box, by which the apparatus is to be secured to a stationary holdfast. The rack E, E, in this instance, is superseded by a chain, the links of which are formed of flat side plates, connected together by transverse bolts and barrels. A horizontal view of a portion of this chain is shewn at fig. 5. The fulcrum-pin C, being withdrawn from the box, the lever is introduced, as shewn; when the pin C, is to be again fixed in the box, passing through the eye or kidney-formed slot of the lever.

In this, as in the former instance, there is a pawle or dog F, which falls in between the barrels of the chain, and holds it securely; and on the pin C, being withdrawn from the box, the lever may be removed, and the flap or cover B, shut down. The pin is then to be again inserted, which, by passing through a ring or eye G, fixed to the inner side of the flap, confines the lid and closes the box, keeping the pawle or dog from rising, by means of a projection b, on

the upper part of the pawle, bearing against the lid. Thus the shroud, or whatever chain or rope may be attached to the link or eye *H*, of the rack-bar or barrel, will be held securely.

When it is required to slacken the tension, the rack or chain may be released by opening the flap *B*, and raising the pawle *F*; and there is a stud *d*, to prevent the pawle being raised farther than is necessary to allow the rack or chain to pass.

A modification, in the construction of the box *A*, is shewn in fig. 6, in which the link *G*, is so formed as to constitute the box, or a substitute for the box, wherein the lever acts, and through which the ladder-chain is conducted. The elongated sides of the link *G*, are spread out into circular plates *A*, *A*, held together by a fixed pin *e*, whereon the pawle *F*, is mounted; and the fulcrum-bolt *c*, on which the lever *D*, acts, is inserted through apertures in the circular plates, and fastened thereto, as before explained. Grooves are formed in these plates for conducting the ladder-chain *E*; at one end of which chain, the link *H*, is attached, that connects the chain with the shroud. The reciprocating operations of the lever *D*, will draw the chain *E*, onward, in the way before described; and a spring, under the pawle *F*, will raise the pawle into its holding position.

In employing the sliding-rack bar, in connection with the toothed lever, the extent of operation of the machine is necessarily limited to the length of the rack; and if that were to be increased, there would be a great liability of the bar becoming bent from accidents, which might render it useless. In order, therefore, to supersede these inconveniences, the ladder-chain is proposed, which is a jointed rack, and in connection with the toothed lever, affords the means of unlimited traction; so also does the toothed wheel

when affixed to the axle of a winding barrel, and acted upon by the toothed lever.

The patentee claims, Firstly,—The peculiar construction of lever described, having teeth or indentations at its end, and an elongated slot or eye to receive the fulcrum-bolt or axle, upon which the lever shall work; which elongated slot or eye may be curved, and will answer best if of a bean or kidney shape, allowing the lever to act upon the rack-wheel or chain, in one direction, and to pass over free in the opposite direction.

Secondly,—The boxes or frames for the lever and slide or chain to work in, with the appendages, represented in the drawing.

Thirdly,—The sliding rack-bar, or the toothed wheel, or chain, in connection with the lever, as described, for drawing up to tension the shrouds of a vessel, or for winding a chain or rope upon a barrel, or for raising or moving heavy weights.—[*Inrolled at the Petty Bag Office, June, 1841.*]

Specification drawn by Messrs. Newton and Berry.

To JOHN WHITE, of Haddington, North Britain, iron-monger, for his invention of certain improvements in the construction of ovens and heated air stoves.—[Scaled 27th September, 1838.]

THE principal feature of this invention, is lining the iron surfaces of the ovens and stoves with fire-clay, for the purpose of enabling their surfaces to retain heat for a considerable length of time, and to give it off slowly and uniformly.

The ovens are formed by double plates of iron, at about half an inch a part; the faces between which, are to be

filled with fire-clay, for the purpose of retaining a uniform heat. No particular shape of oven is claimed.

In Plate II., is a representation of one of the portable stoves, in vertical section. *a*, is the fire-box, of a cylindrical form, made of fire-brick, which is encompassed by a cylindrical casing of plate iron. An aperture is made at *b*, for the introduction of fuel, which is to be coke; *c*, is the grate or fire-bars. The chimney is at *d*, and *e*, is a damper, hung within to regulate the draft up the chimney; and on the top is a plate *f*, covered with a bed of sand, to prevent the escape of smoke or effluvia. On the outside of this stove is a casing *g, g*, surrounding the stove, at a few inches distant; and between the two, zigzag partitions of plate iron are placed, in order to conduct cold air from the bottom round the ash-pit; which air, as it passes up the zigzag channels, becomes heated, and escapes from the chamber *h*, at top, through an adjustable regulator *i*.

The particular novelty in this stove, is lining it with fire-clay, formed in one cylindrical piece, which totally prevents the escape of vapour from the fire, and so long retains the heat, that it will be gradually and uniformly given off, to warm the passing current of air, for many hours, without attention from servants.

Some other constructions of air stoves, are proposed,—as those formed with horizontal tubes, through which the flame and heated vapour from a furnace are conducted. These tubes are to be coated on the outside with fire-clay, in order that the atmospheric air, in passing over and around them, may abstract heat from the earthy surface, instead of coming in contact with the iron.

The precise form of stove, exhibited in the drawing, is not claimed, but merely the fire-clay coating, for the purpose of economising fuel, by concentrating and retaining the heat, and giving it off, uniformly, at a comparatively

Kurtz's, for Impts. in the Construction of Furnaces. 15

low temperature ; so that the air, heated by such apparatus, shall be pure and uninjured by contact with surfaces of heated iron.—[*Inrolled in the Inrolment Office, March, 1839.*]

To ANDRE KURTZ, of Liverpool, manufacturing chemist, for a certain improvement or improvements in the construction of furnaces.—[Sealed 5th November, 1840.]

THESE improvements in the construction of furnaces, consist in a certain novel and peculiar arrangement of the fire-bars upon which the fuel is to be placed ; and also in an improved arrangement or application of certain air passages, chambers, or flues, to be used in combination with the improved grate, and, together, composing the furnace.

The principal object of the improvements, is to effect the consumption of smoke, and consequently an economy of fuel, by preventing the smoke and other gaseous productions of combustion ascending the flue or chimney. This is effected partly by means of the peculiar positions of the grate-bars in the furnace, and also by the particular arrangement and construction of the air chambers or passages, by which heated air is conveyed into the furnace, at the required temperature, and at different parts of the furnace, when it impinges immediately upon the smoke or unconsumed combustible matter, all over the fire-bed upon the grate, by means of an unlimited number of apertures on each side of the furnace, and in front of the fire-bridge of the furnace, which occasions the smoke or gaseous product to be burned.

The principle of the improvements will be readily understood by reference to Plate I., where two distinct

constructions of furnaces are represented,—the one as applied to the ordinary waggon boiler, and the other to the tubular boiler of a stationary steam-engine. Fig. 1, represents an external end elevation of the boiler and furnace; fig. 2, a transverse sectional view of the same; fig. 3, a plan or horizontal view of the walls of the furnace and air passages, with the boiler and upper courses of brick-work removed; and fig. 4, is a view taken in isometrical perspective, through the same, one of the outer walls being removed. This construction of furnace, consists of two separate fire chambers or compartments, formed by the side walls *a, b, c*, and the grate and fire-bars *d, e, f*.

It will be seen in fig. 4, that each grate or fire-place consists of three distinct and separate sets or series of fire-bars;—those marked *d*, inclining, obliquely, downwards from the entrance or fire-door towards the bridge;—those marked *l*, lying perfectly horizontal; and those marked *f*, inclining, obliquely, upwards from thence towards the bridge, thus forming a hollow fire-bed or grate, having a sufficient depth or substance in the middle for the ordinary heating purposes of the furnace, which may be suitably accommodated by modifying the length of the bars *e, e*, and also having a thinner layer of heated coal, gradually diminishing towards the bridge, and approaching towards the bottom of the boiler, to assist the combustion of the smoke, by means of the air passing between the fire-bars and charred coals, at that point just below the bridge.

The series of fire-bars *d, e, f*, are all supported by transverse hollow bearers *g, g*, let into the side and middle walls of the furnace *a, b, c*, and communicating with the air passages or chambers *h, h*, formed in the brick-work or walls of the furnace; these hollow bearers *g, g*, and the chambers or passages *h, h*, are all in continuous connection with each other, opening into the furnace or fire-places at

the apertures *i, i*. The hollow bearers *g, g*, are open to the ash-pit, by having an aperture formed underneath at *j*; and, by being in connection with the passages *h, h*, also communicate with the apertures *i, i*, in the furnace.

It will be observed, that the passages *h, h*, must be closed from the external atmosphere by shutting the doors *h*, h**, which are only opened occasionally to clean the flues. Now, the fire-doors *k, k*, being closed, and the ash-pit *l, l*, being partially closed, (having only a slight opening left at the bottom for the requisite supply of air,) the air will rush into the hollow bearers *g, g*, and also into the passages *h, h*, in the furnace walls, and, being greatly heated by the action of the fire, will disperse itself through the passages or chambers *g*, and *h*, and rushing into the furnace through the several apertures *i, i*, will immediately impinge upon the unconsumed combustible matter above the fire-bed, in an unlimited number of streams or currents, so that the smoke and other gaseous products, will be effectually consumed, instead of passing away to the flue or chimney. If any portion of smoke, yet unconsumed, passes off, a further extension of the hot air passages may be made, by connecting the hollow bearers *g, g*, with side passages, leading to a further air chamber or passage, constructed in the bridge of the furnace, and opening the whole width of the bridge, at the top of the furnace.

Another construction of furnace is represented at figs. 4, and 5. Fig. 4, being a transverse section, and fig. 5, a longitudinal section of an improved furnace, as adapted to a tubular boiler. In these figures, the principal features of the improvements are applied, as in the furnace just described, and all the same parts are marked with corresponding letters of reference. The bridge *m, m*, is divided, having a passage *n*, for the heated air, constructed in it, and opening into the furnace the whole width of the

fire-place, and supplied with air by passages *o, o*, connected with two of the hollow bearers or air passages *g, g*, and opening into the said passage in the bridge; so that any smoke, which may be escaping towards the chimney, will thus be effectually consumed.

The patentee claims the peculiar positions of the fire-bars, particularly their rising, obliquely, from the fire-door, towards the bridge of the furnace, together with the hollow bearers underneath them, by which heated air is obtained, to be distributed through the various air passages in the furnace, which is caused to impinge upon the smoke, over the fire-bed, in an unlimited number of currents, passing through suitable apertures constructed in the furnace or fire-place in front of the bridge; and also the auxiliary air passage, formed in the bridge behind the fire-bed, if necessary, in furnaces constructed for marine purposes, or in such situations where a sufficient quantity of heated air cannot be introduced over the fire-bed.—[*Inrolled at the Petty Bag Office, May, 1841.*]

Specification drawn by Messrs. Newton and Berry.

To JOHN BIRKBY, of High Town, near Leeds, in the county of York, card-maker, for his invention of improvements in machinery for pointing wire, applicable for making cards and pins.—[Sealed 29th October, 1835.]

THIS invention is a machine for cutting successive lengths from a hank or coil of wire, placed at the side of the machine, and pointing such lengths at both ends, for the purpose of constituting double-pointed pins; which pins may afterwards be bent into the forms of staples, and then inserted into sheets of leather, by any of the ordinary

modes, to constitute wire cards, to be employed for scribbling or carding cotton, wool, and other fibrous materials, used in the fabrication of cloth, of different kinds. The said wires, when so double-pointed, may also, by being cut into two pieces, be severally employed as heckle points, for combing long wool, or may be headed by any of the known modes for making dressing pins for wearing apparel.

The construction of this machine, in all its general features, resembles the machines heretofore employed for cutting lengths of wire, and pointing them for making pins, (see Wright's patent of 1824, Vol. IX., p. 281, of the First Series of our Journal.) The present machine has, however, this peculiar property:—that it points the pieces of wire at both ends. It also resembles, in its general features, the various constructions of machinery employed for making cards, as far as the feeding in of the wire, and cutting off the required lengths; but we believe that no such mode of pointing the ends of the wire has been before employed for card making.

This machine, as all such machinery must necessarily be, is of a complicated character, consisting of pincers for conducting in the wire, and carrying it to the different parts to be operated upon;—of levers, worked by rotary wheels and cams, by which the cutters and other parts are actuated;—and of rotary files, for reducing the ends of the wire, and forming them into sharp points.

The patentee does not, however, claim the machinery in its present arrangement, considering it essentially the same in principle, as others which have preceded it, excepting in two or three peculiar features of novelty, which are combined with the other known agents.

The drawings, accompanying the specification, are elaborate, extending over three large sheets; but, without referring to these, we hope to make the invention intelligible.—

The wire is carried in from the end of a hank or coil, to the required distance, at certain intervals, and is there cut off by shears, at every operation, in equal lengths, suited to form each of the respective staples or teeth of the card or shaft pin. In thus advancing, the wire is passed through a small hole in the centre of a pulley, and having been then cut off, the length of wire is held fast in the hole, whilst the pulley is depressed, through the agency of cams, acting upon the levers or arms that carry the gudgeons of the pulley. By these means, the pulley, with the piece of wire, is brought down between two conical cutters or files, and the ends of the wire brought into contact with the peripheries of the revolving conical cutters, which are of steel, and cut all over with file teeth.

The pulley, holding the piece of wire, revolves rapidly, and the conical files also, thereby causing the ends of the wire to be ground off by the file teeth of the cones, and hence to become sharp-pointed.

In order to perform this process of pointing with proper effect, the ends of the wire must come first into operation upon the smaller diameter of the conical files; and as the pointing operation proceeds, the cones slide onward, so that the points are finished at the larger diameter of the cone. This being done, the pulley rises to its former situation, when a pair of nippers, actuated by a cam, move forward, and taking the piece of wire between its chaps, recedes again, drawing the pointed wire out of the hole of the pulley; after which, it is let fall into a receptacle below, and the machine goes on to cut and point another piece, in like manner.

The particular features of novelty claimed, under this patent, are the pulley in which the wire is held, and made to revolve; the two conical revolving file cutters; and the mechanism by which these parts are made to perform their

evolutions, with suitable adjustments for varying the speeds and acting upon different lengths of wire, designed for particular purposes.—[*Inrolled in the Inrolment Office, April, 1836.*]

To WILLIAM LOSH, of Little Benton, in the county of Northumberland, Esq., for his improvements in the manufacture of railway wheels.—[Sealed 26th June, 1841.]

THE patentee considers, that the metal wheels, used on railways, suffer great injury from the effects of the vibrations arising from the concussions to which their tires are subjected, being communicated through the solid metal, whereof the wheels are constructed, to the felloe, spokes, and nave; by which vibrations, the parts are frequently broken or disjointed. He purposes, therefore, to introduce, between the iron tire hoop and the felloe or rim of the wheel, a ring of wood, felt, or rope, or some other more elastic or non-conducting material, which, by intercepting the vibration of the tire, shall prevent the effects of concussion being communicated to the other parts of the wheel.

Several constructions of iron wheels are exhibited in the drawing, accompanying the specification, but not claimed, as being principally like those for which Mr. Losh has obtained a former patent, (see our present Series, Vol. VI., p. 107.) They are merely represented for the purpose of shewing the manner of introducing the non-elastic or non-conducting material between the outer tire-iron hoop and the felloe or rim and interior of the wheel.—[*Inrolled in the Inrolment Office, December, 1841.*]

To JOHN RAND, of Howland-street, in the county of Middlesex, Gent., for improvements in preserving paints and other fluids.—[Sealed 4th March, 1841.]

THIS invention consists, firstly, in enclosing paints and other fluids, in thin-drawn tubes or cases of tin, or such other metal, of sufficient tenacity and pliability, that the tubes or cases, when made, may be closed at both ends air-tight, by merely folding over the metal and nipping the seam so made; and also that their contents may be easily squeezed out by collapsing the tubes or cases with external pressure; by which means, portions of their contents may be withdrawn from time to time, as occasion may require, still preserving the remainder from the injurious effects of the atmosphere.

Secondly:—In the application, in certain cases, of an end nozzle or spout, and an air-tight cap, to the above-described tubes or cases, for the purpose of emitting portions of their contents conveniently, and preserving the remainder by screwing on the cap, provided with a cork for that purpose.

Thirdly:—In the manner of closing the tubes or cases at the ends, so as to render them air-tight.

Fourthly:—In filling the tubes, through a spout or funnel, in such a manner as to exclude the air which might otherwise be forced in with the paint.

Fifthly:—In the application (for preserving paints and other fluids) of metal tin generally, for vessels, tubes, or cases of any shape, out of which the paint or fluid enclosed, may be expressed, as required, by causing the preserving vessel, tube, or cover, to collapse, and remain so at any point.

In Plate II., fig. 1, is a perspective view of one of the

drawn tubes or cases ; fig. 2, is a perspective view of the same tube, after one end has been folded over like a hem, and nipped with a pair of nippers, (see fig. 3,) until the seam or joint, so made, is air-tight ; fig. 4, is a perspective view of the same tube, after it has been filled with paint, with both ends folded over ; fig. 5, is a longitudinal section of the tube or case, fitted with a nozzle or spout and cap ; *a*, being a screw, on to which the cap *b*, screws ; and *c*, a piece of cork, to keep the air from entering ; fig. 6, is a perspective view of one of the tubes, half empty, shewing the sides, where the paint has been squeezed out, in a collapsed state, thereby preventing the ingress of air when the squeezing ceases, and before the cap can be screwed on again ; fig. 7, is a sectional view of one of the drawn tubes, and the spout or funnel in the act of filling the tube.

The force with which the paint enters the tube, drives it off the end of the filler. The tube must not be quite filled, but an allowance must be made for the hem or seam, which is to be folded over after it comes off the filler.

The patentee claims, first,—preserving paints and other fluids, by enclosing them in drawn tubes or cases of tin or other metal, capable of being collapsed ; secondly,—closing the said tubes or cases without the aid of cement or solder, by folding and nipping ; thirdly,—adding, in certain cases, a nozzle or spout and screw, or other air-tight cap, to the said tubes or cases, or to any vessels, tubes, or cases, having the collapsing and other properties aforesaid ; fourthly,—filling such tubes or cases, or any other vessels, tubes, or cases, by means of spouts or funnels, reaching to the bottom of the tube or case, for the purpose of excluding the air during the process of filling ; and lastly,—the application of the metal tin generally, for the manufacture of collapsable drawn tubes or cases, or of collapsable vessels of any form,

for the purpose of expressing from them, and preserving in them paints and other fluids.—[*Inrolled in the Inrolment Office, September, 1841.*]

To WILLIAM WOOD, of Wilton, in the county of Wills, carpet-manufacturer, for his invention of certain improvements in looms for weaving carpets and other fabrics.—[Sealed 24th June, 1840.]

THIS invention applies to looms used for weaving certain descriptions of carpets, rugs, figured velvets, coach lace, and all kinds of fabrics, in which coloured figuring warp threads or yarns are used to form a raised face or figure on the fabric, by looping up such figuring yarns, by means of wires, as is common in all looms used for weaving Brussels carpets and other descriptions of carpeting.

The particular improvements consist in the method of weighting the bobbins which contain the coloured warp threads or figuring yarns, above referred to; and also in the method of mounting the bobbins on their axes in the bobbin frames.

In ordinary carpet looms, furnished with the necessary Jacquard apparatus, the usual plan of weighting the bobbins, is to attach a cord (having a weight at its lower end) to the periphery of a groove, formed at the end of each bobbin; which cord, as the drag or tension, caused by the action of the loom, takes place, becomes coiled round the groove, owing to the bobbin turning on its axis; and when the thread or yarn is slackened, (also by the action of the loom,) the weight, at the end of the cord, pulls the bobbin round the reverse way or back again, and thus takes up the

slack, as it is generally termed, of the yarn. Now, in this arrangement, although the diameter of the worsted or yarn, coiled round the bobbin, is gradually decreasing, as the carpet or other fabric is being made, yet the diameter of the groove on the pulley, to which the weighted cord is attached, remains the same, and consequently, there will be a greater and gradually increasing strain upon the yarn as it becomes used up; and the giving out and taking up of the slack cannot be performed in a regular and proper manner.

The object of these improvements is to equalize, as much as possible, the drag or tension during the whole time that the threads or yarn on the bobbin lasts, or is being used; so that, as the diameter of the yarn, wound upon the bobbin, decreases, the strain or drag of the weight shall be decreased also; that is,—the leverage or radius of the part upon which the cord of the drag-weight is wound, shall decrease in proportion. This object is effected by adapting the drag-cord to the surface of the yarn, coiled upon the bobbin itself, instead of the pulley or groove, as in the old method.

The yarn or thread from the bobbin is passed through a ring, attached to the upper end of the drag-cord, and the drag of the weight is thus brought into direct connection with the yarn.

In Plate II., fig. 1, represents a partial plan view of an arrangement of bobbins, constructed according to this improvement; fig. 2, is a side view, taken partially in section of the same; figs. 3 and 4, are sectional views of one of the improved bobbins detached, and upon an enlarged scale. These figures are intended to shew the different positions of the weight, when the greatest tension or strain is on the yarn, and also when the slack has been let go after forming a loop; fig. 5, represents a front view of one of the improved bobbins, and upon the same scale as figs. 3 and 4;

fig. 6, is a view of one of the old bobbins, with the groove or pulley at its end; and fig. 7, is a section of the same, taken through the groove in the line *y, z*.

In the old bobbin, the weight has always the same leverage as shewn in fig. 7, whether the bobbin be full or the yarn nearly expended; and as the leverage of the yarn on the bobbin is continually altering, the weight never acts with an equal tension; consequently, when the bobbin is full of worsted, or of the largest diameter, and at the greatest leverage or radius, it draws up the bullet or weight too easily;—the effect of this is a waste of worsted, rough work, and a loss of time, in springing the slack threads back.

In figs. 1 and 2, *a, a, a, a*, represent the bobbins supplied with yarn, and mounted each on its own axis in frames *b, b, b, b*, made for that purpose. Thus each bobbin acts by itself, and cannot interfere with any of the surrounding ones. The bearings in which the axles of the bobbins are mounted, are thin plates of iron, attached in any convenient manner to strips of wood; consequently, the amount of friction offered to the axles of the bobbins against their bearings, must be very small.

The figuring yarns or threads are passed from the coil on the bobbins through metal rings *d, d*, and returned to the Jacquard apparatus, or to the loom, in the usual manner; the ring *d*, is attached to one end of a cord *e*, to the other end of which is a pendant weight *f*. When a bobbin is not at work, the ring is gradually drawn towards the middle of the front of the bobbin, and is thus in a position to pull hard, the friction being caused by the weighted cord coiled around the surface of the yarn, and by this effect, the work will be made much clearer at the back.

When the worsted from the bobbin is drawn up in the Jacquard or pattern, the additional tension is released, and allows the wire to be easily and fully covered.

Newton's, for an Improved Weighing Machine. 27

The patentee claims the application of the weighted cord *e*, or any other weighted cord, strap, or chain, directly to the coil of yarn on the bobbin, by means of which, the leverage, against which the weight pulls, becomes gradually decreased, in proportion as the yarn or thread on the bobbin becomes worked up, or the diameter or radius of the coiled yarn reduced; and secondly,—the peculiar method of mounting the bobbins, with their separate axes, in their metal frames or bearings, as above described.—[*Enrolled at the Petty Bag Office, December, 1840.*]

Specification drawn by Messrs. Newton and Berry.

To WILLIAM NEWTON, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, civil engineer, for an improved machine or apparatus for weighing various kinds of articles or goods,—being a communication.—[Sealed 19th September, 1839.]

IN Plate III., fig. 1, is a front view of the balance, and fig. 2, is a side view of the same. *a*, is a pulley, the axle of which being formed with knife-edges at its ends, hangs in pendant bearings *b, b*, made fast to a block *c*, above. The knife-edges of the axle are exactly in the axis of the pulley, and act upon the centres of obtuse angled steel pieces, let into the bearings *b, b*, for the purpose of reducing the friction as the pulley vibrates. An arm *d*, inserted into the periphery of the pulley, and standing in a radial direction from its axle, carries a cylindrical or other suitable weight *e*, which, with its arm, vibrates as a pendulum on the axle of the pulley.

A rope or chain *f*, attached at one end of the pulley, passes partly round or over the periphery of the pulley;

and a scale *g*, appended to the reverse end of the rope, is designed to receive the goods or articles to be weighed. It will be perceived, that on introducing any weighty materials into the scale *g*, the rope *f*, will draw the pulley *a*, partially round upon its axis, and in so doing, raise the arm *d*, and weight *e*, which operate as a counterpoise to the contents of the scale. A stationary quadrant *h, h*, is firmly attached to the block *c*, and has a graduated arc *i, i*, marked on the face of it; and an index *j*, fixed to the axle of the pulley *a*, moves upon the face of the graduated arc as the pulley, with the weighted arm, vibrates. In order to ascertain the weight of any article placed in the scale, the graduated arc must be marked with divisions, corresponding to ounces, pounds, or hundreds, or any other required weights which the apparatus may be calculated to weigh. The draft of the rope or chain *f*, will cause the pulley to turn more or less on its axis, according to the weight of the goods in the scale, which will be opposed by the weight of the arm and counterpoise *d, e*; and when the balance between the two is attained, that is, on the vibrating parts becoming quiescent,—the index *j*, will be stationary, and point to the division on the graduated arc *i, i*, which indicates the amount of weight in the scale. The drawing exhibits an empty scale, under which circumstance the index will point to 0 upon the graduated arc, and the weighted arm hang nearly perpendicular; but the moment that any weight is placed in the scale, its preponderance will draw the pulley round and raise the weighted arm, and also the index, and thereby indicate the amount of weight contained therein.

The construction of the apparatus naturally limits the vibratory action of the weighted arm, within the arc of a quadrant, from the perpendicular pendant position, which is that of rest, and the horizontal position—that of the

greatest leverage or counterpoising power. It will also be perceived, that the cord or chain, by which the scale is suspended, always acting on the periphery of the pulley, and at the same distance from its centre, the leverage there will be at all times the same, providing the machine is correctly made, and in order. The weight *e*, being adjusted to the graduated arc, and fixed upon its rod *d*, which must be done with great accuracy, the operation of the weighing machine, and the movements of its index, cannot, under any circumstance, do otherwise than indicate the true weight of the goods or articles placed in the scale,—the friction being reduced to the lowest possible amount, there being no toothed gear, and the only rubbing parts, the ends of the axle, which are contracted to knife edges.—[*Inrolled at the Rolls Chapel Office, March, 1840.*]

Specification drawn by Messrs. Newton and Berry.

To JOHN HENRY RODGERS, of Birmingham, in the county of Warwick, merchant and manufacturer, for improvements in clasps or fastenings, and connecting pieces, principally applicable to certain articles of dress,—being a communication from a foreigner residing abroad.—[Sealed 13th May, 1839.]

THESE improvements in clasps, buckles, or other fastenings or connecting pieces, principally applicable to wearing apparel, consist, in the first instance, in the adaptation of a lever to buckles or clasp fastenings, as a substitute for the pointed tongue, commonly used; in the second instance, in the adaptation of a spring stop to a clasp, catch, or other fastening, for the purpose of retaining the connection between the two parts when united, or in a holding position;

and in the third instance, in an improved method of connecting the parts of braces together.

In Plate II., fig. 1, exhibits an ornamental buckle, with a band or ribbon attached to it; fig. 2, is a section, taken horizontally through the same; and figs. 3, 4, and 5, represent another form of buckle, constructed on the same improved principle. *a, a*, is the outer frame of the buckle; *b, b*, the lever, substituted for an ordinary tongue, which turns upon pivots at *c, c*. One end of the bandage or strap is to be attached to the bar *d*, and the other end of the bandage or strap is, when drawn tight, to be passed under the front part of the frame and over the edge of the lever, and then under the back part of the frame, as shewn in figs. 7 and 8. The front edge of the lever *b*, will, by the tension of the band or strap, be pressed down upon the front part of the frame *a*, so as to pinch it tightly, and prevent the band or strap from slipping from its hold, as securely as if a pointed tongue or tongues were protruded through the band or strap.

Fig. 8, shews a horizontal section of the buckle and its strap; fig. 9, the adaptation of such a buckle to the back part of a stock. A buckle of this construction is, however, applicable to a great variety of situations, which it is unnecessary to shew.

The improvements in clasps, catches, hooks, or other such fastenings, consist in the adaptation of a spring-stop, which, when the two parts of the clasp or other fastening are put together, shall prevent their separation until the spring-stop is withdrawn.

Fig. 10, represents a piece of plate brass, or other metal, cut or stamped into a suitable form, having a portion of the middle of the plate cut through in the shape of a long tongue. This piece of plate is then to be bent up in the form shewn in the face view, fig. 11, and section or edge

view, fig. 12; *a*, constituting the plate of the clasp *b*, the catch or hook at bottom, and the middle part *c*, being bent into the shape of a spring. Fig. 13, shews the face of the spring-clasp, when so made. The staple or loop of wire, intended to be connected to the clasp, is represented at figs. 14 and 15. The staple being passed over the hook *b*, is to be brought down into the recess of the hook, below the spring *c*, which will confine the staple and prevent its passing out of the hook, until the spring-stop is pressed back, so as to release it.

Another modification of clasp, having a similarly constructed spring-stop, is shewn at fig. 16, and an edge view or section, as at fig. 17. Fig. 18, represents a crutch-ended catch, intended to be coupled to the clasp.

The crutch end *d*, of the catch being introduced into the recess of the clasp *e*, it is to be drawn down past the spring *c*, until the crutch comes against a cross-bar or rest *f*, when the bent end of the spring will act as a stop and prevent the crutch-end of the catch from releasing itself from the clasp, until the spring is pressed back. Fig. 19, shews a similarly constructed clasp, in two positions, of a smaller size; and fig. 20, a clasp, like fig. 13, suited to a gaiter-strap.

Another mode of making a clasp is shewn at fig. 21, which represents a piece of plate brass, or other metal, stamped out to the desired shape; the upper part is then bent down to form the spring *c*, and the lower part bent up to produce the hook, as shewn in the front and edge views, figs. 22 and 23.—This sort of clasp may also be applied to trousers or gaiter-straps.

It is perhaps scarcely necessary to say, that the spring-stop may be made separate from the plate, and soldered or rivetted on in its place. Hooks and eyes, formed of wire, may be made with a spring-stop, on the same principle.

Fig. 24, shews, in two positions, a hook formed of bent wire, having a spring-stop *c* ; and fig. 25, shews another mode of bending wire to form a hook, with a spring-stop *c*, and also the manner in which the wire eye or catch is held by the spring-stop of the hook, when they are connected. Fig. 26, shews, upon a smaller scale, the last-described hook and eye, in several positions, both before and after the hook has been bent up. Fig. 27, represents a pair of braces, for holding up the waistband of a pair of trousers, in which the two improvements of the buckle and clasp are combined ; and also one of the improved modes of connecting the parts of braces together. *A, A*, represent the lever buckles, through which the straps *B, B*, are passed, as described above. The end of the buckle-frame is a plate, cut or stamped to the desired form, and bent up as the clasp above described. *c, c*, are the buttons to be fastened to the waistband of the trousers, the face of the button having a loop formed upon it, shewn in the edge view. The end or hook of the clasp is to be passed over the loop of the button, in doing which, the spring will be pressed back, and when the hook has thus taken hold of the button, the spring will stop or prevent the clasp from becoming disengaged. In this figure is also shewn one of the improved methods of connecting the upper parts or shoulder straps of braces to the lower ones.—It consists in the application of a ring *a*, placed between two double bars or holding pieces *b, b*, and connected thereto by a ring or loose joints at *c, c*. The upper and lower straps of the braces are to be passed through the spaces between the double bars *b, b*, as shewn in the figure. This improved connection will allow the braces to alter their position, and accommodate themselves to the motion of the body of the wearer.

Fig. 28, shews another of these improved methods of connecting the upper and lower straps of braces together ;

in this instance, the same kind of metallic connection is adopted as in fig. 27, excepting that the space between the two lower bars is divided by a partition or stop *e*, and the lower straps of the braces are formed of two distinct ribbands, tapes, or straps, each of which are passed through the space between the double bars *b, b*, and separated from one another by the partition *e*, as shewn in the drawing. This mode of forming the connections, gives a kind of double purchase or draft, and forms a better and more flexible union between the two.—[*Inrolled at the Rolls Chapel Office, November, 1839.*]

Specification drawn by Messrs. Newton and Berry.

*To HENRY HUNTLEY MOHUN, of the Regent's Park, M.D.
for his invention of improvements in the composition
and manufacture of fuel, and in furnaces for the con-
sumption of such and other fuel.*—[Sealed 8th Novem-
ber, 1838.]

THERE are three features of novelty proposed under this patent; firstly,—the composition of an artificial fuel; secondly,—the machinery by which this fuel is compounded and made into cakes, suitable for stowage and use; and thirdly,—some peculiarities in the construction of the furnace of a boiler, in which the improved fuel is to be consumed.

The materials to be compounded for manufacturing the fuel, are peat moss or moss earth, clay, earthy slime, alluvial deposit, coke, animal matters, such as excrement, and green vegetables. These are to be mixed with pitch, asphalte, bitumen, resin, or naptha, and also bark or ground wood, and the shells of any kinds of fruit.

These substances, or such of them as are employed, are to be first reduced to powder by the most convenient means, and then mixed together in a pug mill, as usually employed by brick-makers for mixing their clay and breeze. After this, the materials are to be moulded into blocks or bricks by machinery, similar to that employed for moulding bricks, several constructions of which are shewn by drawings, but not claimed as possessing any novelty, except in its application to the mixing and moulding of the fuel.

The improved construction of furnace for burning this composition fuel, or any other kind of fuel, is shewn in several figures, in connection with a steam boiler, and is stated to be formed upon more correct philosophical principles than any hitherto known. The only feature of novelty however proposed, is the peculiar shape of the passage, by which atmospheric air is supplied to the furnace. The cold air enters by openings below in front of the brick-work, and proceeds up passages, formed at the sides and back of the furnace, and thence down similar passages, parallel to the former, in contact with the furnace; and ultimately into a close ash-pit. In this contorted course, the air becomes rarified by abstracting heat from the furnace, and so passes up through the fire-grate, in a rapid current, and heated state, to support the combustion.—
[Inrolled in the Inrolment Office, May, 1839.]

To GEORGE EDMUND DONISTHORPE, of Leicester, machine-maker, for certain improvements in machinery or apparatus for combing and preparing wool and other textile substances.—[Sealed 7th November, 1840.]

THE present improvements in machinery or apparatus for combing and preparing wool and other textile substances,

apply, in the first place, to improvements upon the machinery or apparatus, described in the specification of a former patent, granted to the patentee, in conjunction with Henry Rawson, of Leicester, hosier,—and consist in certain novel or improved arrangements and constructions of machinery, for giving the required motions to the combs and certain other parts. Secondly,—the improvements apply to another arrangement, construction, or modification of machinery or apparatus, wherein one set of the combs have a circular or revolving motion, and the other an up and down or vertical movement, in contra-distinction to the former, wherein one set of combs have a horizontal or longitudinal sliding motion, and the other a vertical up and down motion; and thirdly,—the improvements apply to a novel or improved method of heating the combs employed in machines for combing wool, and consist in the application and use of hot water, or hot soap and water, or a mixture of hot oil and water, or other hot fluids, as the heating medium employed to heat the combs; some of which fluids will, at the same time, give a degree of moisture to the wool, flax, or other material, and thereby materially assist the operation of combing and preparing wool or other textile substances.

In Plate III., fig. 1, is a vertical section, taken longitudinally through the machine, the side facings being removed to expose the mechanical agents employed to actuate the combs; fig. 2, is a plan view of the same; and fig. 3, a vertical cross section.

In this machine, it will be perceived, there are two sets of combs, moving horizontally, and acting in conjunction with two sets moving vertically, as in the former patent. *a, a*, is the frame-work of the machine; *g, g*, are the combs, working longitudinally, in order to comb out the wool, and are mounted on the sliding tables or carriages *h, h*, as in the former machines; *i, i*, are the holders, with

their handles *j, j*. The holders have the forked projections *i**, *i**, on their under side, and are moved to and fro across the machine, in their process of operation, by means of the rocking-frame and levers *k*, and *k**, having their fulcra at the lower end on the rod *l*, mounted in bearings in the frame-work. The middle lever *k**, carries a stud *m*, which takes into the grooved or double cam *n*, on the shaft *e*, placed crossways of the machine, and turning in bearings on the side-frames. This shaft is actuated by means of a worm-wheel 1, on the main driving shaft 2, taking into a worm-pinion 3, on the shaft *e*; and upon this shaft are mounted pinions *a, a*, taking into the intermediate wheels *b, b*, in gear with the wheel *c, c*, mounted on short axles *d, d*, turning in bearings in the frame-work; and upon these short shafts *d, d*, are mounted the pairs of excentric tappets 4, 4, for regulating the inward progressive motion of the combs *g, g*, as hereafter described; and which, together with certain parts and movements of the saddles or holders of the combs *g, g*, are used in lieu or in place of the gauge-plates in the former patent.

The main driving-shaft 2, turns in proper bearings at each end of the frame-work, and is driven by means of a band or strap, passed from any first mover to the pulley 5, mounted on a pin or stud, projecting from the frame-work. This pulley, when revolving, carries with it the pinion 6, taking into the driving-wheel 7, on the end of the main shaft 2; and upon this shaft, the grooved or double cams 8, 8, are mounted, which give the forward and backward horizontal motion to the combs *g, g*, by means of the levers 9, 9, having their fulcra on the shafts 10, 10, placed across the machine, and turning in bearings in the side-framing. The levers 9, 9, have pins or studs 11, 11, fixed on them, which take into the grooves 12, 12, formed in the cams 8, 8, and their upper ends are connected to

the under side of the tables or comb-carriers *h, h*, by means of the pins 13, 13, which take into forked pieces 14, 14*, attached to the under-side of the carriers *h*; and by these means, the combs *g, g*, will be moved backward and forward along the machine; for as the cams 8, 8, revolve, the levers 9, 9, will give them the required combing motions.

The holding combs *m, m*, are mounted, with their frame *n*, on the sliding-rod *o*, moving through the cross-head *p*, supported in the framing *q*. On the shaft 2, is mounted the excentric or cam 15, which revolving immediately under the end of the rod *o*, forces it upwards, an anti-friction roller 16, being placed on the lower end of the shaft to facilitate this motion.

The holding combs descend gently and bring the wool or material upon the combs *g, g*, whenever they are brought inwards by the action of the excentric 8, and levers 9; the shape of the groove 12, in the excentrics, determining the time the combs *g*, shall rest or remain quiescent, while the holding combs descend or rise. The method of regulating the gradual progressive action of the combs *g, g*, inwards, upon the wool or other material, in order that they may begin operating near to the end of the staple, or not enter too far into it at first, is regulated in the following manner:—

The prongs 14*, of the forked parts of the holders or saddles, are made elastic, and attached to rods 17, sliding through holes in the other prongs, marked 14, and have also compressed coiled springs 18, acting between the pieces 14, and a cross-bar 19, attached to the rods 17; and against this elastic or yielding piece, the pin or stud 13, acts, in bringing the combs inwards or towards the middle of the machine; and as the motion of the levers 9, 9, must always be the same, although the motions of the combs *g*, are unequal,—the means adopted to effect this, are shewn in the

drawings. Upon the saddle or carrier *h, h*, are fixed the arms or levers 20, 20, the ends of which come into contact at each inward motion, with the tappets or cams 4, 4, upon the short shafts *d, d*; and according to the position these tappets are in, so will the lever arms 20, 20, be arrested or stopped in their movement, and consequently, the saddles and combs also. This is shewn by the dotted lines in fig. 1, which represent the parts when beginning to work on a fresh charge of wool, placed in the holding combs *m*; the tappet 4, 4, and arms 20, 20, retarding the progress of the carrier, or saddle and combs *g*, and keeping them back, while the pieces 14*, are allowed to be moved forward; the springs 18, 18, yielding to the action of the levers 9, 9; and as the tappets 4, 4, revolve gradually, their smaller radius will come opposite or be presented to the end of the lever arms 20, 20, and allow the combs *g, g*, at each motion, to come nearer to the combs *m*, until they are nearly in contact, when they will be allowed to operate upon the material, until it is sufficiently combed or prepared.

The arrangements of machinery constituting the second part of the improvements, is shewn at figs. 4 and 5, which are representations of a single-action machine; that is, having but one holding comb, and one pair of drawing combs. Fig. 4, is a partial vertical transverse section, and fig. 6, a front view of the machine. *a, a*, is the framework; *g, g*, are the combs for combing out the charges of wool, mounted upon arms 34, and 35, affixed to the shaft 36. These arms have a rotary motion, communicated to them by means of a band passed over the rigger 37, which is mounted on an axle, and carries the pinion 38, taking into the toothed wheel 39, on the shaft 40,—turning in proper bearings in the side-framing. This wheel 39, takes into another wheel 41, on the end of the axle 36, of the arms 35, 35. *h, h*, are the saddles or carriers upon which

the holding combs *m, m*, are placed. These holders are mounted upon the crank arms 42, affixed to the cross-rod or shaft 43, which rod is passed through and turns in apertures formed in the vertical guide rods *o*, having the required up and down motion communicated to them by the means hereafter described.

Upon the end of the cross-rod or shaft 43, is affixed another crank-arm or lever 44, carrying at its extremity an anti-friction or truck-roller 45, acting in the stationary curved groove or slot 46, formed in a piece or plate 47, attached to the side-framing of the machine. The up and down movement of the vertical rods *o, o*, is effected by the following means:—

Upon the shaft or axle 40, are mounted the cams or eccentrics 48, which act upon anti-friction rollers on one end of the levers 49, having their fulcra on pins or studs, on the side-framing. The other ends of these levers act upon anti-friction rollers 50, mounted upon pins or arms, projecting from the vertical rods *o, o*; and it will be seen, that according to the shape of the cams 48, and their rotation, so will the upward and downward movements of the combs *m, m*, be regulated; and that as the levers 42, with their arms 44, and axes 43, are mounted on the vertical rods *o, o*, the guide-slot or groove 46, by means of the roller 45, will cause the comb *m*, to take the required movement, so as to keep them in the proper position towards the combs *g, g*.

In order to regulate the progressive action of the combs *g, g*, upon the charge of wool or other material, the following mechanism is adopted. Upon the shaft 40, is placed the worm 51, which takes into a wheel 52, upon the shaft 53, turning upon bearings in the frame-work; and upon the other end of this shaft is mounted the eccentric or cam 54, against the periphery of which, the piece 55, on the cross-bar 56, of the vertical rods *o, o*, comes into contact, and

arrests them in their descending motion; the smaller diameter of the excentric 54, as it revolves, coming opposite the piece 55, which consequently regulates the extent to which the charge of wool shall be presented to the action of the combs *g, g*, during the operation of combing. The mechanism for giving the to and fro motion of the combs *g, g*, crosswise of the machine, is not shewn, as the method described in the former machine, may be readily applied to this.

The method of heating the combs by the application of hot water, hot soap and water, or a hot mixture of oil and water, or hot oil, or any other suitable fluid, as the heating medium, is effected in the following manner:—

A vessel of wood, metal, or earthenware, of convenient length and breadth, to receive the combs, is made, and pipes or flues heated, either by steam, or any other convenient means. The vessel is to be filled with the fluid, and when it has become heated to the required degree, the combs are immersed in the same, and retained therein until they have become sufficiently heated for the purpose of combing, when they are removed by the attendant, and applied to the filling-frame, where they receive their supply of material, and are immediately affixed to the holders or carriers *h, h*, of the combing machine, and replaced, before they get cold, by fresh heated combs.

The patentee claims the novel or improved arrangements and constructions of machinery for combing and preparing wool and other textile materials, to which such machinery or apparatus may be applicable; and particularly the application and use of the cams or excentrics, as the mechanical agents for giving the required motions to the combs, and also giving to the holding combs the required movements in respect to the rotary motion of the combs, so as to bring the wool or other material gradually under their operation.

Heindryckx's Impts. in Fire-places and Furnaces. 41

And lastly, the application and use of the hot fluids or liquids, hereinbefore named, as the heating media for heating the combs in wool-combing machines, or those used for other textile substances.—[*Inrolled at the Petty Bag Office, May, 1841.*]

Specification drawn by Messrs. Newton and Berry.

To FLORIDE HEINDRYCKX, of Fenchurch-street, in the city of London, engineer, for certain improvements in the construction and arrangement of fire-places and furnaces, applicable to various useful purposes.—Sealed 24th April, 1841.]

THIS invention of certain improvements in the construction and arrangement of fire-places and furnaces, consists in the suppression of the ordinary fire-bars of stoves, furnaces, or fire-places, and in place thereof constructing the said fire-places with inclined sides; and sometimes, in conjunction with this novel construction, employing a single indented bar or shaft, for the purpose of regulating the combustion of the fuel; or in place of the indented bar or shaft, a receiver for metal may be employed, when the improved furnace is applied to the smelting of metals.

The effect of this new arrangement or construction of furnaces or fire-places, is, that the fuel descends by its own gravity towards the opening of the air passage, and the air cannot enter the internal part of the fire-place without passing through a body of ignited fuel; and the result is, the more advantageous employment of the caloric given out, and consequently the production, with a given quantity of fuel, of a greater degree of heat than in ordinary fire-places, or of an equal degree of heat with a smaller quantity of fuel.

This new construction of fire-place may be advantageously applied to every purpose for which furnaces are used.

Sometimes it may be found desirable, when applying the invention to locomotive and some other purposes, to employ two or more fire-places, in combination, under one arch or dome.

In Plate III., fig. 1, represents a horizontal section of the most simple construction of the furnace, and fig. 2, is a transverse section of the same, taken in the line A, B, of fig. 1. The inclined sides are shewn at *a, a*; they are made of stone or fire-brick, and are supported by strong iron plates of iron *b, b*, which are sustained by bearings *c, c, c*.

When the furnace is employed for locomotive purposes, the inclined sides may be made of copper, iron, or other metals. The ash-pit is seen at *d, d*, and *e, e, e*, are flues or tubes, communicating with the chimney.

When the furnace is employed for smelting metals, a receiver, into which the molten metal descends, is applied to the bottom of the fire-place, as shewn by dots at *f*, in fig. 2;—*g*, fig. 1, is an opening made in the front of the furnace, for the purpose of stirring the fire.

Fig. 3, represents a modification of the above, in which a longitudinal bar or shaft *h*, is employed, which extends the whole length of the bottom of the furnace. This bar or shaft is made of a peculiar form, and mounted in bearings *c, c, c*, to allow of its being turned on its axis, for the purpose of bringing down the cinders, and also regulating the combustion of the fuel. Fig. 4, represents a transverse section of the bar or shaft *h*; fig. 5, a plan or horizontal view of a portion of the same, shewing the manner of mounting it in its bearings *c, c*; and fig. 6, represents an end view thereof.

It will be seen by referring to these three figures, that the bar or shaft is indented on two sides, the other two sides being plain or cylindrical. It will therefore be evident, that when the indented sides of the shaft are presented to the plates *b, b*, of the furnace, that air is allowed freely to ascend between the shaft and the plates, and act upon the fire; but when the plain or cylindrical side is turned and presented to the plates *b, b*, the air is prevented from entering the fire-place, and consequently the fire will be extinguished. It is evident, therefore, that by turning this bar or shaft in its bearings, the combustion of the fuel may be regulated to the greatest nicety.

Fig. 7, represents an external view of the furnace; *i*, being the fire-door, and *j*, a hole for observing the state of the fire; *k*, is a lever for turning the bar or shaft *h*; and *l*, is a trap, for the purpose of raising and lowering the bar or shaft *h*, when wishing to empty the fire-place.

The patentee does not confine himself to the precise arrangement herein shewn, nor to any particular angle, at which the sides *a, a*, of the fire-place or furnace are to be made; but he claims, first, the suppression of the ordinary fire-bars of furnaces or fire-places, and in lieu thereof, constructing the said fire-places or furnaces with inclined sides, as above described; and secondly,—the employment of a bar or shaft, for the purpose of regulating the combustion of the fuel, as above described.—[*Inrolled at the Petty Bag Office, October, 1841.*]

Specification drawn by Messrs. Newton and Berry.

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 460, Vol. XIX.)

"On the formation of Embankments and the filling-in behind retaining Walls."

By John B. Hartley, M. Inst. C. E.

The numerous failures of the embankments in the construction of railways, and the constant occurrence of defects in retaining walls, induced the author to offer some remarks upon the subject.

He first examines the ordinary mode of commencing the embankment at the contemplated finished level, and proceeding with the work at that height throughout, leaving the material to find its own inclination; forming the required slopes on the sides when the filling is completed. This he contends (although without doubt the most rapid mode of proceeding) is defective in principle, for the material, as it is deposited, forms layers or strata at such an inclination as its nature permits, and always has a tendency to slide in the direction of the slope. In such cases, as the centre sinks, the sides slide away, and having nothing at the feet to resist such a tendency, they are carried out to a dangerous extent. This is particularly the case with clay embankments, for the material is generally brought from the cuttings in large lumps, which cannot be consolidated as they are deposited: the water lodges in the interstices, keeping the bottom soft; and when it begins to subside, it slides away, until it has formed itself into a slope, at which it can resist the pressure.

To prevent this sliding, the author recommends proper footings being prepared for the sides of the embankments, by cutting trenches, about 4 feet 6 inches deep along the bottom line of each

slope, and forming a 'cop' of sods or of stones, placed at right angles to the line of the slopes. These footings must be of a strength proportioned to the height of the embankment, and the whole length should be completed before the filling is commenced, that they may become solid, and the sods have grown together, before the weight is brought upon them.

He advises, also, that instead of carrying on the filling in one lift, two embankments should be made, varying in height from 15 feet to 20 feet, according to the nature of the material, wide enough for two earth waggon on the top ; one of them running along each side of the site of the contemplated embankment : a valley would thus be left in the centre at the junction of the two inner slopes. When they have been carried along the whole length, or to such a distance as would insure their being considerably in advance, the second or the final lift may follow. With clay or soft materials, four low lifts following each other would be advisable ; with these precautions slips of the embankments would be of rare occurrence. The bottom would become solid by the passing of the weight over it, and the succeeding lift being thrown into the centre valley, must settle vertically. The subsidence, which is always in the line of inclination, would be concentrated and thrown inwards ; by these means the width of the slopes would be restricted and the work would be constructed much cheaper, there being a saving of both land and labour. Land springs, which are usually only discovered by the pressure of the weight above, would be more easily reached with the low lifts than when covered by the heavy ones.

This mode of construction has been practised by Mr. Jesse Hartley, on the Manchester and Bolton Railway, where the embankments were very heavy, and the material of the worst description : yet the work was executed in a most satisfactory manner, and the cost of the maintenance of way upon that line is quoted as being less in proportion than on any other railway in the kingdom.

This method may require more time, and be a little more expensive, but the author is of opinion that the trifling difference in

time and cost would be amply repaid by the freedom from expense when the road was opened.

The author then examines the subject of retaining walls. He considers the method of filling towards the wall from the natural bank behind, to be highly objectionable; the material lies in strata at the angle at which the deposit is made; as the quantity increases, the subsidence commences, and the earth slides downwards, throwing its whole weight against the back of the wall. The tendency to slide is frequently accelerated by the natural form of the ground upon which the earth is thrown, as it not unfrequently inclines towards the wall, in which case the pressure will necessarily be in proportion to the inclination of the slope, and the nature of the material of which the filling is composed. The wall at Hunt's Bank, on the river Irwell, is instanced as a failure of this description. The wall, about 100 feet in length, and 20 feet in height, 5 feet thick at the bottom and 3 feet 6 inches at the top, built of ashlar masonry, strengthened by counterforts, was forced into the stream by the pressure of the earth behind it.

With proper attention to the manner of filling the different materials, a comparatively slight wall may be constructed to sustain a considerable weight of backing. The author lays down as a rule that, wherever it is practicable, all filling behind walls should be commenced at the wall, and be proceeded with from thence towards the solid ground, by which means the strata would be inclined in a similar direction: ledges or benches, either level or inclined in an opposite direction to that of the bank, should be cut in the solid ground to receive the filling, and counteract its tendency to slide. The weight should not be laid too quickly upon a new wall, and if with these precautions care be taken that the counterforts are constructed simultaneously with, and well tied into, the wall, a comparatively weak structure will bear a heavy mass of filling.

The author gives as an example, the retaining wall constructed on the west side of Jackson's dam, near the Brunswick Graving Docks, Liverpool. This wall, although built of slight dimensions,

and filled behind with material of the worst description, resisted perfectly all strain; this could only be attributed to the filling having been gradually done in the manner which the author's practice leads him so strongly to recommend.

This communication was accompanied by diagrams descriptive of the mode of constructing embankments.

May 25, 1841.

HENRY ROBINSON PALMER, V. P., in the Chair.

"A Tabular Statement of the Dimensions and Proportions of Forty Iron Vessels."

By Lieut. E. N. Kendall, R. N., Assoc. Inst. C. E.

The vessels, the dimensions and proportions of which are given in this communication, were all built by Mr. John Laird, of Liverpool: they are adapted to a variety of purposes, so that they present but little uniformity.

The "Rainbow" and the "Glowworm" are celebrated for their speed; their proportions of beam to length, are above one to six, and more than 3 tons to each horse power, which is generally assumed to be the proper ratio for sea-going steamers.

The tabular statement gives the dimensions and tonnage of the vessels, the power of the engines, the proportion of beam to length, and of tons to each horse power, the names of the owners, and the stations where the vessels are plying.

"On the Stationary Engines at the new Tunnel on the Liverpool and Manchester Railway."

By John Grantham, Assoc. Inst. C. E.

This communication gives a description of two pair of stationary non-condensing engines, which were constructed by

Messrs. Mather, Dixon, and Co., of Liverpool, from the designs and under the superintendence of the author.

The steam cylinders are 25 inches diameter, with a length of stroke of 6 feet; they have side levers like marine engines, but the connecting rods are reversed, and convey the power downwards to the machinery, which is placed in vaults cut out of the sandstone rock; upon which the beam pedestals are fixed without any framing. Cast-iron slides are used instead of the usual parallel motion, and after several years' constant use, they exhibit no marks of deterioration.

The drum wheel is 21 feet diameter, and makes usually twenty-two revolutions per minute, when drawing up a train at the rate of 15 miles per hour; there is a groove in its periphery, at the bottom of which is wound a small cord to form a bed for the main rope to rest upon—this main rope encircles about two-thirds of the circumference; it is made of the best Russia hemp, in three strands, patent shroud laid, the inner strand being composed of 40 yarns of white hemp, overlaid by 40 yarns of hemp, tarred to the point of saturation; this arrangement is found most conducive to the lightness and durability of the rope; its circumference was 6 inches, and its length, when new, was 4800 yards: in the first few weeks it stretched to the extent of 10 per cent. of its length, after which it remained unchanged under the tension imposed. The total weight is 8 tons 8 cwt., and the cost was £2. 8s. per cwt. It is guided by 474 grooved pulleys, 14 inches diameter, and by 6 sheaves 5 feet diameter. A new rope will last well for three years, after which it is renewed by splicing in a short portion each time, so as to reduce the amount of stretching.

The length of the inclined plane is 2370 yards, at varying gradients; giving an aggregate rise of 77 feet 1 inch, and a mean rise of 1 in 92. The tunnel is 2220 yards long. The average weight of the trains drawn up is 55 tons—and the time occupied is six minutes. The pressure of steam is usually from 50 lbs. to 60 lbs. when the engines begin to wind, and sinks gradually to about 30 lbs. in the reservoir during the time it is working.

From some experiments made by Mr. Edward Woods, the details of which are given, it has been ascertained that each pound per square inch pressure of steam upon the pistons, over and above the 7.56 lbs. necessary to overcome the friction of the machinery, is capable of drawing one carriage weighing 5 tons gross up the inclined plane.

On the first erection of these engines, in order to comply with the provisions of an act of parliament, it was necessary to work them with steam generated in boilers, at a distance of 448 yards, and conveyed through pipes 10 inches diameter, laid in a tunnel excavated through the rock. Several experiments were made to determine the relative amounts of pressure in the boiler and the steam reservoir, and the quantity of steam which was condensed in a certain time. The results were, that when the engine was standing still, the difference of pressure was about 3 lbs., and when working with a load, it was as much as 13 lbs. The quantity of steam condensed, was on an average about 156 gallons per hour.

Subsequently, a set of tubular boilers, similar to those of locomotive engines, were erected close to the engines, and are now constantly worked instead of those at the great distance ; the economy of fuel has been considerable. The consumption of gas coke under the tubular boilers, is about 15 tons per week, at ten shillings per ton. The larger boilers consumed about 30 tons in the same time.

Mr. Edward Woods gives his approval of the action of the engines, and the employment of non-condensing engines generally for this class of work, on account of their great simplicity, and the readiness with which they may be brought into full action, so that the greatest power is always at hand to start the train ; whilst during the intervals of working, the steam may be suffered to accumulate. These advantages are rarely attainable with condensing engines, as unless a small engine be employed to keep up the vacuum, there is a difficulty in starting them with the train attached to the rope.

This communication is accompanied by four detailed drawings
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of the engines and machinery, and by a model of Mr. Grantham's apparatus for regulating the admission of steam to the valves.

Mr. Fairbairn bore testimony to the good quality of the engines and machinery described by Mr. Grantham; their performance had been very satisfactory.

The mode of keeping the rope in tension was an improvement upon the plan which Mr. Fairbairn had previously adopted at the Wapping Tunnel, of the same railway. He would present drawings of that machinery to the Institution.

The loss by condensation in long steam pipes, is so considerable, that it has been generally found more economical to transmit power by a line of shafts, than to convey steam to any great distance.

He had recently constructed some Cornish pumping engines of large size, with side levers and reversed connecting rods; they had answered extremely well. Drawings and descriptions of them would be presented to the Institution.

" On the Percussive Action of Steam and other Aeriform Fluids."

By Josiah Parkes, M. Inst. C. E.

In a previous communication "On the Action of Steam in Cornish single-pumping Engines," Mr. Parkes, after a careful analysis of the ascertained facts of the quantity of water which, in the shape of steam, passed through the cylinders of the engines, arrived at the conclusion that the steam's elastic force was insufficient to overcome the resistance opposed to it. On obtaining this remarkable result, he was induced to examine the circumstances under which the steam is applied, and was convinced that from the instantaneous and free communication made between the boiler and the cylinder of these engines, an action, distinct in character from the simple pressure of steam, must be transmitted to the piston. And, in order to convey some precise idea of the

peculiar nature of this action, he adopted the term "percussion," to distinguish such action from that due to the simple elastic force of the steam. Various phenomena, connected with the working of the engine, were adduced in confirmation of the views then advanced. In the present communication, Mr. Parkes has resumed the subject, and brought forward numerous facts derived from experiment and observation, on steam and elastic fluids generally, in further corroboration of his opinions respecting the percussive action of steam in engines.

The effect of the percussive action of steam may be clearly traced on the indicator diagrams, (a series of which, forty-one in number, taken from four engines, with different indicators, the pressure of the steam varying from 6.5 to 34.7 lbs. per square inch, accompanied the communication,) and it will be seen that, in every instance, the piston was driven to a greater height than that due to the simple elastic force of the steam; in many instances a greater pressure was marked than existed in the boiler. The difference in the action, according as the steam is admitted suddenly, or gradually, into the cylinder of the engine, may be also distinctly traced on the diagrams.

The same effects were observed on the sudden admission of steam upon the surface of the mercury in the cistern of the mercurial column. In these experiments, the steam being let on gradually, the gauge marked a pressure of 40 lbs. per square inch, which was the true pressure in the boiler; but, being admitted suddenly, the gauge exhibited a pressure of at least 60 lbs. and the same results were repeatedly obtained.

The steam generator of Mr. Perkins will afford a good illustration of the effect of the steam's instantaneous action. The pressure in this apparatus is denoted by an instrument having an index moving round a dial plate. Steam of 26 atmospheres being suddenly admitted, the index was observed, during repeated trials, to register a pressure as high as 36 atmospheres, and then to recede until it remained stationary at 26 atmospheres, which was the pressure in the generator.

The results of these various experiments are arranged in two

tables, exhibiting an analysis of the elements into which they may be resolved.

The author then proceeds to point out the different circumstances of the pumping and crank engines, in respect of their realizing, beneficially, the steam's percussive action. In the latter, this instantaneous action takes place (as the indicator diagrams show) when the connecting rod and crank are in one vertical line, so that it is inefficiently expended; the centre, by the agency of the fly wheel, not having been passed. In the former, the load and frictional resistance alone, oppose the descent of the piston; the piston is free to move, and the steam's action is wholly efficient in impelling it; and, whatever the amount of the percussive action, it will be accounted for in the effect.

A remarkable confirmation of the conclusions arrived at, and the views advanced by Mr. Parkes in his previous communication, had been furnished by Mr. W. West. The cylinder cover of the Fowey Consols engine, 80 inches in diameter, and weighing 4 tons, springs upwards at the centre $\frac{3}{4}$ rd of an inch, on the sudden admission of steam, which in the boiler has a pressure of 49·7 lbs.; and $\frac{3}{4}$ rd or $\frac{1}{4}$ th of an inch, the steam in the boiler being 61·7 lbs.; but no change of form, or springing, occurs when the steam is let on gradually, and fills the cylinder at the same pressure as that in the boiler.

The author adduces many other facts in illustration and confirmation of his views; as, the oscillation of the mercury in steam and vacuum gauges; the audible sounds produced in a steam pipe on suddenly checking the motion of the elastic fluid by shutting a cock; the curious phenomena connected with the impact of elastic fluids on each other, particularly those observed by Mr. Greener on firing gunpowder in long open-ended barrels; and, in conclusion, suggests whether these remarkable facts may not serve to assist in elucidating some of the very difficult and apparently inexplicable phenomena, connected with the explosion of steam boilers.

Mr. Lowe had recently made some experiments, which in his opinion confirmed Mr. Parkes' views on this interesting subject.

A pressure gauge, attached to a line of gas pipes, showed, when the communication was slowly opened, a pressure of four inches column of water; but it invariably exhibited a maximum of oscillation of full six inches column on the sudden opening of the small stop-cock between the pipe and the gauge.

In a line of pipes, full of gas, the whole volume of gas received an impulse on suddenly opening the valve at one end, and the passage of the undulating wave was indicated by the sudden and successive depression of the water in the gauges along the whole line.

Mr. Homersham could not agree with Mr. Parkes as to the effect due to what he termed the "percussive action of steam:" he believed that the superior economy of the Cornish Engines, as far as related to the action of steam in the cylinders, would be found to be due to the amount of the expansion of the steam; which depended, not only upon the opening and closing of the steam valve, but also upon the greater or less area of the aperture of the throttle valve. It was evident, that on closing the steam valve, the space between it and the throttle valve would be filled with steam of a density nearly, or quite, equal to that in the boiler; therefore, on the first admission of the steam into the cylinder, it might be presumed to act upon the piston with that pressure: considering, likewise, that a short interval of time necessarily occurs for setting in motion the beam, with the heavy pump rods appended to it; but immediately the piston starts, expansion takes place, as the throttle valve prevents the steam from following the piston freely, so that a greater degree of expansion must take place when the steam is at a higher density; for the throttle valve being then more closed, offers a greater resistance to the steam following the piston. The indicator diagram of the East Crinnis Engine showed this effect to a certain extent, although neither in that nor in the diagram of the Huel Towan Engine was there nearly the same degree of pressure exhibited in the cylinder, at the commencement of the stroke, as in

the boiler ; but it was evident, that those diagrams could not be relied upon, as they did not account for the whole duty done by the engines, either on the percussive or the expansive principle.

Assuming a bushel of coal to weigh 94 lbs., as generally reckoned in Cornwall, and that 1 lb. of coal would evaporate $10\frac{1}{2}$ lbs. of water, it could readily be shewn, that the quantity of water converted into steam by one bushel of coal, would, when expanded in a cylinder, during $\frac{1}{16}$ th of the stroke, lift upwards of 257 million lbs. one foot high in one minute ; which was a much greater duty than was realized by any Cornish engine.

Mr. Seaward allowed that Mr. Parkes had clearly shewn, that a certain amount of effect was due to the sudden impact of the steam upon the piston of a pumping engine. Whether the term "percussion," as applied to this action, was the proper one, he would not then examine ; but the effects shewn to have been produced, and the phenomena attendant upon the exhibition, were so remarkable, that he conceived the subject to merit the most deliberate investigation of engineers as well as philosophers. He had previously objected to the theory, on the ground that the effect could only be in the ratio of the weight of the steam multiplied into its velocity ; but he believed the subject must be examined in a different manner ; and although the principle must always have existed, it was only in consequence of modifications in the application of steam, that the effects had been so fully developed.

Mr. Parkes mentioned, that since his paper had been written, he had found an experiment which was strictly analogous to his proposition. It was related by Mr. Robins, who was so justly celebrated as a mathematician and philosopher, and first discovered that the gas evolved from gunpowder was a permanently elastic fluid.

"When gunpowder is fired in an exhausted receiver, mercurial guage instantly descends upon the explosion, and as suddenly ascends again. After a few vibrations, none of which, except the first, are of any great extent, it fixes at a point which indicates the density of the enclosed gas."

He considered this result as corroborating those obtained by himself, as well as justifying the comparison he had drawn between the instantaneous action of gunpowder gas and steam. Mr. Robins's words precisely described the steam's action, as traced on the indicator diagram exhibited.

The springing of the cylinder cover referred to, and in the manner stated, must, he thought, satisfy every one, that the steam's instantaneous action far exceeded in effect that of its simple elastic force, which was proved to have been unequal to produce any change in the parallelism of the cover.

As regarded Mr. Homersham's investigation of the power of the steam in the Huel Towan Engine, it was correct that the initial steam was in a state of expansion during $\frac{1}{10}$ th of the stroke, but not all the steam, for it had not all entered the cylinder until the piston had travelled through nearly $\frac{1}{2}$ th of the stroke. His calculations were, therefore, hypothetical, and not in accordance with the facts of Mr. Henwood's experiment.

June 8, 1841.

The PRESIDENT in the Chair.

"Description of Stephenson's Theatre Machinery."

By J. B. Birch, Grad. Inst. C. E.

In this communication the author describes a system of machinery which was erected for the purpose of avoiding the confusion, mistakes, and noise, consequent on the number of men usually employed in the stage department of a theatre, and with a reduced number of men, to effect more perfectly all the operations required there.

The apparatus provides means for shifting simultaneously and without noise, any number of distinct pieces of scenery, bringing at the same time into view other scenes to replace them. The general arrangement of the machinery for effecting this, is fully described.

The interior of the house between the basement and the roof, is divided into four compartments, viz.:

1. A raised platform on which the gearing for working the stage traps is placed. The trap frames are mounted upon rollers; they traverse on the lower platform in every direction; and when brought under the apertures in the stage, allow the traps to sink or rise steadily at any required speed.

2. The stage, with its traps of various dimensions, including a considerable portion formed to rise or fall by suitable machinery, and called the sinking stage.

3. The lower flies or corridor, between which and the stage are placed the wings or side scenes, and the border frames are suspended.

4. The upper flies, upon which is placed the machinery, to communicate motion to the whole: from the upper horizontal shaft, by means of bevel gear, provided with double clutches to reverse the motion and shafts, on the lower ends of which are the slow-motion wheels and drums, an endless chain is driven horizontally in either direction; to this are attached the borders, representing clouds, foliage, arches, &c.

The side scenes or wing frames, the number of which is determined by the depth of the stage, may be either flat, circular, or triangular, and receive a rotary motion, combined with or apart from a forward and backward movement at pleasure, and can be placed at any desired angle to the audience. At every change of the scene they revolve through 120° or one-third of a circle, and the scenes when removed from sight, are replaced by those which are to succeed them.

The traversing frames revolve on a centre, and are suspended from the border frames, or from the upper part of the theatre, for crossing the stage in any direction, and at any given inclination.

Several improvements in the mode of lighting the stage and house have been introduced with the machinery; they are more fully referred to in the detailed description which accompanies the ten elaborate drawings sent with this communication.

"On the Combustion of Anthracite, and its value as a Fuel for Steam Engine and other Furnaces."

By Andrew Fyfe, M.D.

Anthracite, although known as a valuable fuel for particular purposes, is so difficult of combustion, that it has hitherto been very partially brought into use; it has, however, become desirable to introduce it more generally, and the author having been engaged in testing the value of Mr. Bell's patent furnace, was induced to make some experiments on the use of anthracite in conjunction with that system.

The objects sought to be obtained by the apparatus are, to insure a larger amount of evaporation, by passing heated air, unmixed with the products of combustion, through tubes in the boiler and surrounded by the water, thus increasing the evaporating surface; and that the surplus caloric taken originally from the fuel, and not given out in its passage through the water, should be beneficially used in aiding the combustion beneath the boiler.

It has been found in the manufacture of iron, that anthracite could be advantageously used by means of heated air; the author, therefore, considered that the experiments upon this apparatus (the intrinsic merits of which he does not at all discuss in this communication) afforded an advantageous opportunity for ascertaining in what manner this fuel could be successfully employed under steam boilers.

The anthracite supplied to the author was unfortunately of inferior quality, analysis giving only of fixed carbon 71·4, and of volatile inflammable matter 13·3; the setting of the boiler required much alteration before sufficient draught could be procured. The fuel was thrown on to the bars by hand, which is the worst manner of using it, as from its density, and its being a bad conductor of heat, it decrepitates when it first inflames, unless it is previously warmed;—this was found to occur for a short time, but on the application of the heated air, the decrepitation ceased, and combustion went on steadily.

In ascertaining the amount of evaporation, the water at a

temperature of 45° was injected by hand from a vessel, the contents of which was measured, and the level in the boiler regulated by the float and index.

The fire was brought up to a certain intensity before commencing, and was left in the same state at the end of the experiment; this mode of proceeding, although objectionable with bituminous coal, is not so with anthracite, as it does not swell during combustion so as to alter the bulk of the fire.

The results of an experiment extending over $8\frac{1}{2}$ hours, without interruption, are then shown in a tabular form. In this trial, 448 lbs. of anthracite were thrown on the fire, in four equal portions, at intervals of two hours; 3560 lbs. of water at 45° were pumped into the boiler, and evaporated under a pressure of 17 lbs. per square inch.

After deducting $40\frac{1}{2}$ lbs. of unconsumed coal which fell through the bars, the amount of evaporation was found to be 8.73 lbs. of water for each pound of coal consumed. If the feed water had been at a temperature of 212° , the evaporation would have amounted to 10.03 lbs.

During this trial the air in the tubes of the boiler never exceeded 430° , but on subsequent occasions it was raised as high as 700° .

This product of evaporation is below that obtained by other persons, which the author attributes to the inferior quality of the specimens of anthracite, and the admission of cold air above the furnace bars when throwing on the fuel.

His opinion is, that when anthracite is completely burned, the practical evaporative power will be found directly in proportion to the amount of fixed carbon contained by it—that with the exception of the loss of heat which is always transmitted to the brick-work of the furnace, and of that which is carried up the chimney to keep up the draught, the whole of that evolved by the fixed carbon will be retained by the water; because from good fuel there is little or no escape of gaseous matter, and hence the superior efficacy of anthracite.

From the analysis of a number of specimens of anthracite, the

author found the quantity of fixed carbon to amount to 90 per cent. The evaporative power of these fuels, as fixed by Berthier's process (*la voie sèche*), would amount to 12·3 lbs. of water for each pound of coal consumed.

He calculates that 6 lbs. of anthracite will evaporate 1 cubic foot of water under the ordinary circumstances of a steamengine boiler, and taking the average specific gravity of bituminous fuel at 1280, while that of anthracite is 1410, there is a difference of nearly 10 per cent. in favour of the latter, considering the space in which it can be stowed.

This is an important consideration for its use on board steam vessels, but it is essential that its rate of combustion should be such as to raise steam rapidly, its capabilities for which the author then proceeds to examine, and deduces from the experiments that the combustion of the anthracite was carried on so as to produce a greater amount of evaporation, in a given time, than could be obtained from bituminous coal. This result is attributed in some degree to the use of heated air.

The author recommends that the anthracite should be supplied to the furnace by a hopper through the boiler, wherein it is warmed before reaching the fire bars, which obviates the inconvenience of decrepitation, and insures regularity in the supply of steam.

Original Communication.

ON THE ENGINEERING OF THE ANCIENT EGYPTIANS.

BY J. S. PERRING, ESQ.

MANY YEARS A RESIDENT IN EGYPT.

No. V.

The Egyptian edifice that elicited the warmest admiration of the ancients, was the celebrated Labyrinth. A few fragments of the ruins are still found near the entrance of the Fyoom,

but they are so scanty that we must be solely indebted for a description to the accounts left us by ancient authors.

Herodotus thus speaks :—" It exceeds, I can truly say, all that has been said of it ; whoever will take the trouble to compare them, will find all the works of Greece much inferior to this, both in regard to the workmanship and expense. The temples of Ephesus and Samos may justly claim admiration, and the pyramids may individually be compared to many of the magnificent structures of Greece ; but even these are inferior to the Labyrinth. It is composed of twelve courts, all of which are covered ; their entrances are opposite to each other, six to the north and six to the south ; one wall encloses the whole ; the apartments are of two kinds ; there are fifteen hundred above the surface of the ground ; and as many beneath,—in all three thousand. The upper apartments I myself examined, and pronounce them among the greatest efforts of human industry and art. The almost infinite number of winding passages through the different courts, excited my warmest admiration : from spacious halls I passed through smaller apartments, and from them again to large and magnificent courts, almost without end. The ceilings and walls are all of marble, the latter richly adorned with the finest sculpture ; around each court are pillars of the whitest and most polished marble. At the point where the Labyrinth terminates, stands a pyramid one hundred and sixty cubits high, having large figures of animals engraved on its outside, and the entrance to it is by a subterraneous path."

From this general description, it may be difficult to draw a plan, but an edifice that contained upwards of three thousand apartments and many courts, must have been a wonderful work, even in a country abounding with wonders ; but, alas ! a few blocks of hard limestone glistening yet in the sun with a sparkling brilliancy, and two or three granite columns, are all that remain of its magnificence. The pyramid spoken of by Herodotus has been despoiled of its external casing of stone, and now presents a rude mass of crude bricks, of which its core was composed.

Pliny says, that the Labyrinth was constructed entirely of

stone,* and observes, that time was unable to destroy it. It was divided into sixteen parts, according to the number of the districts of Egypt, and contained a temple to every Deity.

Strabo says, that its passages were so intricate, that a guide was indispensable. It was such an extraordinary building, that the learned came from all parts to visit it,—Dædalus having journeyed to Egypt for the purpose of examining it, built the Labyrinth in Crete for King Minos, on the same model.

Most of our readers will, no doubt, be surprised to learn that the whole of Egypt was environed by a wall. Diodorus Siculus mentions, that part of it was built by Sesostris, “to guard against the incursions of the Syrians and Arabs,” and “extended from Pelusium by the desert to Heliopolis.” But we have seen portions, on the eastern side of the valley, still remaining higher up the country than this latter place, and also near Hieraconpolis, on the western side, found traces of its existence. Ebn Haukal says:—“Formerly the Fyoom was entirely surrounded by a wall. I have seen a considerable portion which still exists on the side of the desert, and where towers may be distinguished; but the greater part is buried under the sands.” Wilkinson also observes, that he has met with it in the Fyoom. Of its existence round the whole of Egypt, we do not doubt; at least at every place where the country lays open to the attacks of the lawless sons of the desert. It was assuredly a wiser and cheaper plan of protection than that of subsidising them, as is done at present. It was not continuous, as many places are so naturally defended by precipitous rocks, as not to require it; and in others, the position of their towers defended the defile. It chiefly stretched across the lateral valleys, opening into the great valley of the Nile, and was pierced in many places with small openings for the passage of the torrents, flowing from the mountains during the occasional rains occurring in that country. It was built of small crude bricks, the total length being probably about 1400 miles, averaging fifteen feet high and five feet thick. The great wall of China,

* This remark will apply to nearly every Egyptian edifice.

built for a similar purpose, can only, of all military works in ancient or modern times, be placed in comparison with it.

All ancient authors unite in giving the Egyptians the honor of being the inventors of Geometry, for the land of Egypt being annually overflowed, and all property confounded, they were obliged, on the retreat of the waters, to have recourse to mensuration, in order to determine the limits of each man's possession.

In our last paper, we have seen that Geometry had made great progress, even at the very early period of the erection of the pyramids; in fact, that it had departed from the mere practical art of land surveying, from which it had originated, to the state of an abstract science.

It seems quite clear that the celebrated theorem of the proportions of the sides of a right-angled triangle, was then known; and yet we are currently informed that Pythagoras (who travelled and studied in Egypt 1600 years afterwards) discovered it; and in consequence, offered a hecatomb to the gods! In our observations on the canal of the Fyoom, we remarked on the skill of the Egyptians in the art of levelling; and another instance came under our notice in levelling round the base of the Great Pyramid, when the platform or pavement, extending round it, was found perfectly and truly horizontal.

Indeed, the proper supply of every portion of the country with water, depended entirely on this skill; and the arrangement and direction of the canal of the Red Sea, is such as to shew that they possessed not only a perfect knowledge of the art, but good instruments also, whatever may have been their nature or construction.

A proof of the judgment of the Egyptian engineers, may be mentioned with regard to the new openings or mouths made for the Nile. The action of a river so loaded with sediments as that, is to form bars at the place where its current is arrested by the still waters of the ocean, and therefore they made new channels to the sea, remote from these impediments to the free ingress and egress of vessels. Another purpose was also served

by such channels, namely,—to provide water to districts, previously but scantily supplied with that necessary.

A canal was formed, at an early period, from the Nile to Racotis, an Egyptian city, on whose site Alexandria was afterwards founded; but it does not appear that the water of the river was allowed to flow through it into the sea, as they were probably apprehensive of choking up the fine harbour of that place with deposit. The canal appears simply to have been for the conveyance of water to Racotis, and to the fertile land of the Marcotic nome. At a later period, it was enlarged to serve the purposes of commerce also.

Herodotus states :—" The Egyptians were the first who erected altars, shrines, and temples; and none before them ever engraved the figures of animals on stone." From Cairo to Esne, the valley of the Nile, is bounded by mountains of limestone; and from thence to near Essouan, by sandstone; and the neighbourhood of Essouan and the cataracts, yield the fine granite for which Egypt was noted.

The earliest monuments of Egypt were of limestone; indeed, experience only, as Sir Gardner Wilkinson has observed, could have taught the Egyptians, that a stone so easily worked as their sandstone, had sufficient endurance or became harder by exposure. When this became apparent, it seems to have been generally preferred, on account of its even texture throughout, and from the quarries at Silsili yielding stones of any magnitude.

The principal quarries of calcareous stone, lay in the neighbourhood of Tourah, the material being there very compact, and having but few petrifications. In our last, the method pursued in obtaining stones from these quarries for the pyramids, was described; but this was not their usual mode of quarrying, though followed in that particular case, from the great quantity of blocks required. The upper strata are thin, and of loose texture; consequently, unfit for finished work,—therefore, they were not quarried, but grottoes or excavations made in the thicker firmer strata, in which the workmen, shaded from the heat of a burning sun, pursued their labours under favorable circumstances.

These excavations contain many tablets, recording the purposes for which the quarries were worked,—the name of the monarch, and sometimes that of the officer superintending the operations.

One of these inscriptions, of which copies are now before us, may be thus translated :—" In the twenty-second year of the reign of the monarch, ruler of an obedient people, the sun of the Sun Thothmes, the Giver of Life, this quarry was opened.—The stone strong, bright, and good, is to make additions to the temples of the gods, ever living, Pthah, Apis, and Amun, at Memphis."

A long horizontal gully was first cut along the face of the rock, of sufficient width for a man to lay down and pick before him ; and if square blocks only were required, a narrow cut was made at back, and on each side, and the block then detached by a row of wedges from below. After the removal of a few blocks, the operation became easier, as the rock was left stepped up, and only removed in regular course, still leaving the masses in steps or stages, whereon the workmen could stand.

Every stone was cut out to the precise form and dimensions required, as a great object was served thereby, for the natural bed would be preserved in the building. This precaution is of great importance in calcareous stone ; and we have not seen an instance, in an Egyptian building, where it has been neglected ; and although long stones for columns could have been procured with great ease, by quarrying them horizontally, yet the ancient Egyptians always cut them out perpendicularly.

The sandstone quarries of Hadjar Silsili, are of immense extent, and though the material is more homogeneous, yet the mode of working seems to have been precisely the same as in the limestone quarries of Tourah.

The vastness of the quarries in Egypt, excite surprise, which is increased by the reflection, that stone was only used for their temples and their tombs ; the houses of all ranks being of crude brick.

The tools used, appear to have been very simple,—the cutting

instrument being a pick, and the temper of the point (whatever metal it was) must have been excellent, as each stroke made a cut from 12 to 18 inches in length. After the stones were quarried, they were drawn out by tackle, and the holes, whereto they were fastened, still remain at many of the entrances. From the quarries to the river side, large blocks were conveyed, as has been mentioned before, on sledges; but small stones were probably taken in carts, drawn by oxen, as they were well acquainted with the use of wheel carriages.

The mode of working above described, would, of course, be too laborious for granite; and we find that in the granite quarries of Essouan, the blocks were split off nearly to the size required, by rows of wedges driven in together. Where a long square object, such as an obelisk, was required, a row of wedges, marking the width, was driven in vertically, and another row for the depth, horizontally. It need scarcely be remarked, that the greatest care and the skill of practice, would be required to prevent rupture, otherwise than in the direction of the length; and also that fracture from both sides should be simultaneous.

[*To be continued.*]

List of Patents

Granted by the French Government from the 1st of July to the 30th of September, 1840.

(Continued from page 359, Vol. XIX.)

PATENTS FOR FIVE YEARS.

François, represented in Paris by M. Perpigna, advocate, for bracelets in elastic metal.

Hazard, of Paris, represented in Paris by M. Perpigna, advocate, for an improved dressing table.

Kirk, represented in Paris by M. Perpigna, advocate, for an improvement in machines for making bobbin net.

Mallan & Sons, of London, represented in Paris by M. Perpigna, advocate, for a mineral succedaneum, to fill up decayed teeth.

- Marion, represented in Paris by M. Perpigna, advocate, for the manufacturing of lace paper.
- Piet and Co, represented by M. Perpigna, advocate, for improvements in billiards.
- Parquin, represented by M. Perpigna, advocate, for improved metallic plates and dishes.
- Achet, of Paris, for an improved varnished paper for packing.
- Ajasson, of Paris, for improvements in the manufacturing of sulphuric acid.
- Allemand, of Marseilles, for indigenous chocolate.
- Anbouet, of Paris, for an improved kind of soap.
- André, alias Duvignaud, of St. Jean d'Angély, for an apparatus for making brandy.
- D'Angles and Bienbar, of Paris, for a pulverising machine for oleaginous seeds.
- Antoine, of Metz, for a new method of cleaning bottles.
- Arnaud, of Lyons, for improved metrical measures, with projecting pins, for folding cloths and other fabrics.
- Aubriel, of Paris, for a razor in crystal glass.
- Autier-Boche, of Hirson, for an apparatus to cure smoky chimneys.
- Averly, of Lyons, for an improved hydraulic machine.
- Bader, of Paris, for improved boots for ladies and gentlemen.
- Bogatta, of Paris, for an imperishable ink.
- Bailly, of Paris, for a new ventilator.
- Bailly and Lebedal, of Paris, for improved pinchers for extracting fish bones.
- Balla, of Toulouse, for a liqueur called *eau des baigneurs*.
- Barbot, of Elbeuf, for a circular mirror.
- Barbier and Daubrée, of Clermont-Ferrand, for improvements in the manufacturing of sugar.
- Barratte, of Lons-le-Saulnier, for a new method of directing balloons.
- Barthélemy, of Marseilles, for a new kind of press.
- Bataille, of Rouen, for a machine for printing borders of cravats.
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List of Patents

That have passed the Great Seal of IRELAND, from the 17th December, 1841, to the 18th of January, 1842, inclusive.

Robert Holt, of Manchester, in the county of Lancaster, cotton spinner, and Robinson Jackson, of Manchester, aforesaid, engineer, for certain improvements in machinery or apparatus for the production of rotary motion, for obtaining mechanical power,—which said improvements are also applicable for raising and impelling fluids.—Sealed 31st December.

Joshua Taylor Beale, and Benjamin Beale, of East Greenwich, in the county of Kent, engineers, for certain improvements in engines to be worked by steam, water, gas, or vapours,—which improved engine may also be used as a pump.—Sealed 14th January.

List of Patents

Granted for SCOTLAND, subsequent to December 22nd, 1841.

To John Juches, of Lewisham, Kent, for improvements in furnaces or fire-places.—Sealed 28th December.

Montague McDonogh, of St. Alban's-place, Middlesex, for improvements in spindles, flyers, and bobbins, for spinning, roving, twisting, and reeling all sorts of fibrous or textile substances, and in the application or adaptation of either, or all of them, to machinery for, the same purposes,—being a foreign communication.—Sealed 4th January.

Thomas Joseph Ditchburn, of Orchard House, Blackwall, Middlesex, ship builder, for certain improvements in ship building; some or all of which are applicable to steam boats, and boats and vessels of all descriptions.—Sealed 6th January.

Moses Poole, of Lincoln's Inn, for improvements in preparing matters to be consumed in obtaining light, and in the con-

struction of burners for burning the same,—being a foreign communication.—Sealed 7th January.

William Petrie, of Croydon, Surrey, for a mode of obtaining a moving power, by means of voltaic electricity, applicable to engines and other cases where a moving power is required.—Sealed 7th January.

James Taylor, Jun., smith and engineer, Turner's-court, Glasgow, for a self-acting machine, for driving piles and stakes, and for other such purposes, to be so wrought by steam or other power.—Sealed 10th January.

John George Bodmer, of Manchester, engineer, for certain improvements in the construction of screwing stocks, taps, and dies, and certain other tools or apparatus, or machinery for cutting and working in metals.—Sealed 13th January.

William Petrie, of Croydon, Surrey, for improvements in obtaining mechanical power.—Sealed 13th January.

Alphonse Rene de Mire de Normandy, of Redcross-square, London, M. D., for certain improvements in the manufacture of soap.—Sealed 13th January.

Henry Hough Watson, of Bolton-le-Moors, Lancaster, consulting chemist, for certain improvements in dressing, stiffening, and finishing cotton and other fibrous substances, and textile and other fabrics, part or parts of which improvements are applicable to the manufacture of paper, and also to some other processes or operations connected with printing calicoes and other goods.—Sealed 18th January.

John Lee, of Newcastle-upon-Tyne, manufacturing chemist, for improvements in the manufacture of chlorine.—Sealed 19th January.

John Thomas Carr, of Newcastle-upon-Tyne, for improvements in steam-engines,—being a foreign communication.—Sealed 19th January.

Robert Stirling Newall, of Gateshead, wire rope manufacturer, for improvements in the manufacture of flat bands, and in machinery for the manufacture of wire ropes.—Sealed 20th January.

New Patents

SEALED IN ENGLAND.

1841-2.

To William Robinson Kettle, of Waterloo-street, Birmingham, Warwick, accountant, Benjamin Wakefield, of Ryland-street, North, Birmingham, civil engineer, and William Crosher, of Cumberland-street, Birmingham, aforesaid, screw manufacturer, for an improved bolt for building, and other purposes.—Sealed 24th December—6 months for inrolment.

Montagu Macdonogh, of St. Alban's-place, Middlesex, Gent., for improvements in spindles, flyers, and bobbins, for spinning, twisting, and reeling all sorts of fibrous or textile substances, and in the application or adaptation of either, or all of them, to machinery for the same purposes,—being a communication.—Sealed 6th January—6 months for inrolment.

Edward Hall, of Deptford, civil engineer, for an improved steam boiler.—Sealed 11th January—6 months for inrolment.

Samuel Hearne Le Petit, of St. Pancras place, St Pancras road, for certain improvements in the manufacture and supply of gas,—being a communication.—Sealed 11th January—6 months for inrolment.

James Chesterman, of Sheffield, mechanist, and John Bottom, also of Sheffield, aforesaid, mechanist, for certain improvements in tapes for measuring, and in the boxes for containing the same.—Sealed 11th January—6 months for inrolment.

Charles Wye Williams, of Liverpool, Gent., for certain improvements in the construction of furnaces, and effecting combustion of the inflammable gases from coal.—Sealed 11th January—6 months for inrolment.

John Tresahar Jeffree, of Blackwall, engineer, for certain improvements in lifting and forcing water and other fluids, parts of which improvements are applicable to steam engines.—Sealed 11th January—6 months for inrolment.

Richard Dovor Chatterton, of Derby, Gent., for certain improvements in propelling.—Sealed 11th January—6 months for inrolment.

- James Ions, of Newcastle-upon-Tyne, Gent., for improvements in smelting copper ores.—Sealed 13th January—6 months for inrolment.
- Julius Bordier, of Austin Friars, merchant, for certain improvements in preparing skins and hides, and in converting them into leather.—Sealed 13th January—6 months for inrolment.
- Caleb Bedells, of Leicester, manufacturer, and Joseph Bedells, of the same place, assistant to the said Caleb Bedells, for improvements in the manufacture of elastic fabrics, and articles of elastic fabrics—Sealed 13th January—6 months for inrolment.
- Joseph Barnes, of Church, near Accrington, Lancashire, manufacturing chemist, for certain improvements in the working of steam-engines.—Sealed 13th January—6 months for inrolment.
- Henry Waterton, of Winsford Lodge, Chester, Esq., for improvements in the manufacture of salt.—Sealed 13th January—6 months for inrolment.
- John Jeremiah Rubery, of Birmingham, umbrella and parasol furniture manufacturer, for improvements in the manufacture of a certain part of umbrella and parasol furniture.—Sealed 13th January—6 months for inrolment.
- Moses Poole, of Lincoln's-inn, Gent., for improvements in the construction of locks,—being a communication.—Sealed 15th January—6 months for inrolment.
- John Thackeray, of Nottingham, lace thread manufacturer, for improvements in the process of preparing and gassing thread or yarn.—Sealed 15th January—6 months for inrolment.
- Thomas Lambert, of Regent's Park, musical instrument-maker, for improvements in the action of cabinet piano-fortes.—Sealed 15th January—6 months for inrolment.
- Edward Palmer, of Newgate-street, philosophical instrument-maker, for improvements in producing, printing, and embossing surfaces.—Sealed 15th January—6 months for inrolment.
- James Cole, of Youl's-place, Old Kent-road, brush manufacturer, for certain improvements in the construction of brushes.—Sealed 15th January—6 months for inrolment.
- Cornelius Ward, of Great Tichfield-street, musical instrument

maker, for improvements in flutes.—Sealed 18th January—6 months for enrolment.

William Tindall, of Cornhill, ship owner, for a new and improved method of extracting or manufacturing from a certain vegetable substance, certain materials, applicable to the purposes of affording light and other uses.—Sealed 19th January—6 months for enrolment.

William Baker, of Grosvenor-street, Grosvenor-square, surgeon, for certain improvements in the manufacture of boots and shoes.—Sealed 27th January—6 months for enrolment.

John James Baggaly, of Sheffield, seal engraver, for certain improvements in making metallic dies and plates for stamping, pressing, or embossing.—Sealed 27th January—6 months for enrolment.

Andrew Kurtz, of Liverpool, manufacturing chemist, for certain improvements in the manufacture of artificial fuel.—Sealed 27th January—6 months for enrolment.

Francis Marston, of Aston, in the county of Salop, Esq., for improvements in apparatus for making calculations.—Sealed 27th January—6 months for enrolment.

Samuel Mason, of Northampton, merchant, for improvements in clogs,—part of which improvements is applicable to shoes and boots.—Sealed 27th January—6 months for enrolment.

Gottlieb Boccus, of the New-road, Shepherd's Bush, Gent., for certain improvements in gas, and on the methods in use, or burners for the combustion of gas.—Sealed 27th January—6 months for enrolment.

William and John Galloway, and Joseph Haley, of Manchester, engineers, for certain improvements in machinery for cutting, punching, and compressing metals.—Sealed 27th January—6 months for enrolment.

Pierre Journet, of Dean-street, Soho, engineer, for improvements in steam-engines,—being a communication.—Sealed 27th January—6 months for enrolment.

Henry Benjamin, of St. Mary-at-Hill, fish factor, and Henry Grafton, of Chancery-lane, machinist, for improvements in preserving animal and vegetable matters.—Sealed 27th January—6 months for enrolment.

CELESTIAL PHENOMENA FOR FEBRUARY, 1842.

D. H. M.		D. H. M.	
1	Clock before the sun 13m. 55s.	—	Ceres R. A. 1h. 47m. dec. 5.
—	☽ rises Morn.	—	7. N.
—	☽ passes mer. 4h. 47m. M.	—	Pallas R. A. 23h. 52m. dec. 7.
—	☽ sets 9h. 28m. M.	—	54. S.
2 10 26	☽ in ☐ or last quarter.	—	Jupiter R. A. 18h. 56m. dec. 22.
3 18 13	♂ in conj. with Her. diff. of dec.	—	46. S.
	0. 5. S.	—	Saturn R. A. 18h. 47m. dec. 22.
5	Clock before the sun 14m. 21s.	—	24. S.
—	☽ rises 4h. 46m. M.	—	Georg. R. A. 23h. 34m. dec. 3.
—	☽ passes mer. 8h. 15m. M.	—	34. S.
—	☽ sets 11h. 44m. M.	—	Mercury passes mer. 1h. 21m.
6 11 50	☿ in conj. with ☽ diff. of dec.	—	Venus passes mer. 23h. 59m.
	2. 26. N.	—	Mars passes mer. 2h. 24m.
14 29	♂ in conj. with the ☽ diff. of	—	Jupiter passes mer. 21h. 17m.
	dec. 1. 46. N.	—	Saturn passes mer. 18h. 47m.
7 17 9	♂ in conj. with Pallas, diff. of	—	Georg. passes mer. 23h. 34m.
	dec. 5. 56. S.	15 6 4	♂ greatest elong. 18. 6. E.
9 12 52	♀ in conj. with ☽ diff. of dec.	8 38	♂ in Perihelion
	2. 44. S.	—	Clock before the sun, 14m. 28s.
18	☽ in Apogee.	—	☽ rises 8h. 22m. M.
10	Clock before the sun, 14m. 34s.	—	☽ passes mer. 3h. 37m. A.
—	☽ rises 7h. 16m. M.	—	☽ sets 11h. 9m. A.
—	☽ passes mer. 0h. 13m. A.	18 6 8	♂'s first satt. will im.
—	☽ sets 5h. 19m. A.	18 11 41	☽ in ☐ or first quarter.
11 54	Ecliptic conj. or ☉ new moon.	20	Clock before the sun, 14m. 4s.
19 8	♂ in the ascending node	—	☽ rises, 11h. 15m. M.
19 17	♀ in Aphelion	—	☽ passes mer. 8h. 6m. A.
11 17 32	♂ in conj. with the ☽ diff. of	—	☽ sets 3h. 57m. M.
	dec. 3. 35. S.	21 7 8	♂ stationary.
12 19 27	Her. in conj. with the ☽ diff. of	22	Occul d ₁ Cancr ₁ im. 8h. 59m.
	dec. 5. 28. S.	—	Occul ♂ Cancr ₁ im. 12h. 52m.
13 9 28	♂ in conj. with the ☽ diff. of dec.	24	Occul ♀ Leonis, im. 9h. 46m.
	5. 38. S.		em. 10h. 50m.
14	Mercury R.A. 22h. 58m. dec.	2	☽ in Perigee.
	5. 49. S.	25	Clock before the sun, 13m. 23s.
—	Venus R. A. 21h. 34m. dec. 15.	—	☽ rises, 6h. 30m. A.
	45. S.	—	☽ passes mer. Morn.
—	Mars R. A. 0h. 1m. dec. 0.	—	☽ sets, 6h. 40m. M.
	27. S.	4 15	Ecliptic oppo. or ☉ full moon
—	Vesta R. A. 2. 15m. dec. 8.	16 43	♂ greatest Hel. Lat. N.
	22. N.	—	Occul ♀ Leonis, im. 8h. 17m.
—	Juno R. A. 16h. 26m. dec. 10.	27 4 42	Juno in ☐ with the Sun.
	33. S.	6 3	♂'s fourth satt. will em.
		28 5 55	♂'s third satt. will im.

J. LEWTHWAITE, Rotherhithe.

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CONJOINED SERIES.

No. CXXIII.
Recent Patents.

To WILLIAM NEWTON, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, civil engineer, for an invention of certain improvements in machinery or apparatus for making or manufacturing screws,—being a communication.—[Sealed 24th October, 1839.]

THESE improvements in machinery or apparatus for making or manufacturing screws, were communicated to the patentee by Dr. Hull, of the United States, and apply principally to that class or description of machinery for making metal screws, commonly called wood screws, and consist in improved constructions and arrangements of machinery, containing certain novel mechanical agents, adapted to perform the several offices of cutting the screw-shafts or blanks, forming the head, trimming and nicking or notching them, and cutting the thread upon the shaft.

In Plate IV., fig. 1, represents a horizontal view of the machine for forming and heading the screw-blanks; fig. 2, is a vertical section, taken longitudinally through the machine, in the direction of the dotted line *a, b*; and fig. 3, is also a vertical section, taken transversely through the machine, in the direction of the dotted line *c, d*.

This machine is mounted upon suitable frame-work and standards, to support the several axles, the fulcra of levers, and the sliding or moving parts. A length of wire or rod *a, a*, is fed into the machine; it may be of wire from a hank, placed at the side, whence it proceeds between rollers *b, b*, which draw the wire forward; *c, c, c*, are the rollers, which straighten it as it advances. The end of the wire is protruded through an aperture in the frame, and through the open dies *d, d*, and it is in that situation afterwards held firmly by the closing of the dies. By a lateral movement of the dies, the piece of wire so held is cut off at the proper length for forming one shaft or screw-blank, the back of the dies having a cutting edge, which is brought against a stationary piece *f*, fixed in the frame-work, forming the other edge of the cutter. The position of the screw-blank, held in the dies, being now opposite to the punch *g*, is favorable for the operation of heading; and the punch being made to approach the protruded end of the wire-shaft, compresses the end of the wire into a recess in the dies, and thereby forms the head.

A, A, A, is the main shaft or rotary axle, on which the several wheels and cams are fixed for working the operating parts of the machine. The axle is driven by a band and rigger, and is governed by a fly-wheel. Upon this shaft a cam *B*, is fixed, in which an excentric groove is formed, as represented by dots. A sliding bar *c, c*, has a roller at one end, working in the groove of the cam *B*; and the reverse end of this sliding bar is jointed to one arm of a lever

D, D, which vibrates loosely upon a small shaft E. To the upper end of the lever D, spring-clicks *d, d*, are attached, (see fig. 1,) which take into the teeth of a ratchet-wheel F, fixed on the small shaft E. On this small shaft also, the lower drawing-roller *b*, is fixed, the axle of the upper drawing-roller being mounted in bearings in the frame;—their peripheries are pressed together by tightening screws at top. There is a notched groove in the periphery of each of these drawing or feeding-in rollers, for the purpose of holding fast the wire *a*, passed between them, which is advanced by the rotary action of the wheels and shaft E, F, *b*.

It will now be perceived, that on the main shaft A, and the cam B, revolving, the roller at the end of the sliding bar C, acting in the excentric groove of the cam G, will cause the bar C, to slide to and fro in its staple or bearing *e*, and hence to produce a vibratory action to the lever D. The clicks *d, d, d*, by these means, will give a small rotary movement to the ratchet-wheel every time that the lever D, moves forward, which movement being communicated through the shaft E, to the lower roller *b*, will advance the wire *a*, forward, at intervals of sufficient distance to form the lengths of the several screw-blanks. The wire being thus brought forward, and its end protruded through the dies *e, e*, a grooved cam G, fixed on the main shaft, as it revolves, acts upon the end of the bent arm of a lever H, H, (see fig. 2); the reverse end of which lever is connected by the piece I, to the knee-joint levers K, K, seen in figs. 1 and 3. By the descent of the lever H, and the piece I, the levers K, are brought down nearly into a straight line, which causes the moveable side of the die *e*, to be pressed up against the stationary side of the die, and the wire to be held firmly between them.

In order now to cut off the length of the wire, so held in the dies, the frame L, L, in which the dies are mounted,

is slidden laterally by a similar contrivance; viz.—by the straightening of the levers *m, m*, connected to a lever *n*, which is worked by a grooved cam *o*, likewise fixed on the main shaft *A*. This lateral movement of the frame *L*, and dies, forces the wire *a*, against the sharp edge of a fixed cutter *f*, and thereby separates the portion of wire held in the dies (which is to form the screw-blank) from the continuous length of wire behind it.

This sliding movement of the dies has now brought the end of the screw-blank exactly opposite to the punch *g*, which must be advanced for the purpose of crushing the end of the piece of wire or screw-blank into the recess in the dies, in order to form the head of the screw. This is effected by the action of another pair of levers *p, p*, one of which is connected to the sliding punch *g*, the other being jointed to a stationary bearing *h*; and the junction of the two levers is connected to a strap-lever *z*. From the lower part of this strap-lever, on its sides, two rollers or studs *i, i*, extend, working in two grooved cams *y, y*, one of which is shewn at fig. 2. Upon the main shaft, between the two last mentioned cams, a tooth or cam *x*, is likewise fixed, which, as the shaft goes round at the proper time, comes into contact with the under edge of the strap-piece *z*, and raises it, thereby bringing the levers *p, p*, into a straight line; and as the tooth *x*, passes the perpendicular point of its rotation, it forms, with the strap-piece *z*, another infinite lever, assisting to drive the punch forward, and to give the required force for crushing the end of the screw-blank into the recess of the dies, and forming the head.

When the tooth *x*, has passed the perpendicular, and released itself from the strap-piece *z*, that lever is allowed to fall, and with it the joint of the levers *p, p*, descend, which draws back the punch and allows the headed

screw-blank (the dies being then open) to be pushed out of the dies by the wire coming forward to form the next screw. But as this descent of the strap lever *z*, and the joint of the levers *p, p*, may not be always effected by their gravity alone, an arm *q*, is attached to the strap-piece *z*, which extends downwards. A long slot in the arm *q*, allows an auxiliary shaft *r*, to pass through it, and upon this shaft, as a guide, the arm *q*, slides up and down. This shaft *r*, turns in bearings in the side frames, and receives rotary motion through a toothed wheel *s*, fixed upon it, which takes into a similar wheel *t*, upon the main shaft. Upon this shaft *r*, a tappet *u*, is fixed, which, as it revolves, strikes against a tail-piece *v*, at the bottom of the arm *q*, and thereby draws down the arm, and with it the joint of the levers *p. p*.

Fig. 4, is an elevation of a machine, in which the headed screw-blanks are placed in a hopper, and are severally discharged from thence into a groove or passage below, and conducted in consecutive order into certain holders for the purpose of receiving the subsequent operations.

Fig. 5, is a horizontal view of the same machine, as seen from above, but from which the hopper is removed. This machine also contains the parts for trimming or turning the shafts and heads of the screw-blanks, in order to render them true. *A*, is a hopper, placed above the machine, and supported upon brackets, extending from the frame-work. Into this hopper the screw-blanks are thrown in a promiscuous heap. The lower part of the hopper being open, the screw-blanks fall on to the periphery of two drums *B, B*, (with which the hopper is nearly in contact,) and slide down into the contracted space between the two drums, as may be seen in the detached view in section of the drums and hopper, at fig. 6. In this contracted passage two thin strips of plate metal *a, a*, are placed horizontally, forming

a narrow groove or guide between them, into which the shafts of the screw-blanks fall and hang down the under sides of their heads, resting upon the edges of the plates. Such, however, of the screw-blanks as do not come down perpendicularly, are prevented, by the breadth of their heads, from falling into the groove, and lay cross-wise upon the top edge of the guide-plates *a, a*. In order, therefore, to bring them all into perpendicular positions, spring-lifters *b, b*, connected to the drums, are, at proper times, projected into the contracted passage under the hopper, and above the guide-groove; and as the drums revolve, these lifters raise up the screw-blanks which have not fallen into the groove, holding them by the under parts of their heads, and then letting them fall, in order that they may pass perpendicularly into the groove.

The rotary motion of the drums is effected by a train of toothed gear, actuated from any of the rotary parts of the machine; and the drums are made to revolve together very slowly but simultaneously, by a rim of teeth on their edges, which take into each other.

The means by which the spring-lifters *b, b*, act, will be understood, by examining their construction and the forms of the cam rings *c, c*, shewn best in fig. 6. The spring-lifters *b*, are straight rods, placed in longitudinal ranges within the drums, standing in nearly radial positions. They are supported by brackets *d*, in which they slide, and their outer ends are flattened and protruded through narrow openings, in the periphery of the drums, having helical springs to project them outward. The hinder part of each of the rods are confined by bosses or heads, bearing against the backs of bars *e*, which carry small rollers at their ends; and these rollers, as the drum goes round, act against the internal periphery of stationary cam rings *c, c*, affixed to the frame-work. The greater portion of

the internal periphery of each of the fixed cam rings, is circular, and stands concentric with the axis of the drum; but it will be seen, that a part of the ring has an enlarged diameter. When the roller *e*, is running round the circular or smaller radius of the ring, the sliding rods *b*, *b*, are kept back; but when the roller comes to the enlarged part of the diameter of the ring, the force of the springs project the sliding rods through the opening in the drum, which takes place as the drum revolves, at the instant that the opening in the drum has passed above the edge of the guide-plates or groove *a*, *a*. The thin flattened ends of the sliding bars *b*, in both drums, are thus at the same time, brought under the hopper against all the screw-blanks which have not fallen into the groove *a*, *a*; and as the drums proceed in their rotary progress, the series of bars or risers *b*, *b*, lift the screw-blanks up a little distance, and when the smaller radius of the rings, acting upon the rollers, draw the sliding-bars *b*, back again, the screw-blank is let fall into the groove *a*, *a*, below.

This groove is curved downwards for the purpose of leading the screws, in consecutive succession, into a situation to be taken hold of by other apparatus, for submitting to the subsequent operations.

When the screw-blanks are placed in the groove, under the hopper, by the means above described, they are to be driven laterally from under the hopper into the curved part (just mentioned) of the grooved passage, by the following means:—

A sliding rod *f*, (see fig. 5,) having its end bent up to form a tooth, is placed at the end of the groove, which, being moved onward at stated periods, drives all the screw-blanks before it, from that part of the groove which is beneath the hopper, into the curved passage, leaving the groove under the hopper, after its return, free to receive a fresh supply.

The movements of the sliding rod are effected by a lever *h*, connected to its outer end; this rod is forced inward, at intervals, by a spring *i*, the movements of the lever being regulated by a bolt *k*, connected to it; the end of which bolt works against a face-cam, on the edge of the rotary drum.

The manner in which the screw-blanks are taken from the lower end of the curved groove *a*, is as follows:—On the side of the frame, a bracket *j*, supports a sliding piece *l*, the inner extremity of which slider is formed like a spoon, having a recess *m*, for the reception of the screw-blank, as shewn in the horizontal section of the holding and turning part of the machine, at fig. 7.

It may, however, be necessary here to state the means by which the principal operating parts of the machine are actuated, before their details are described.

Upon the axle *c*, the rigger is fixed, by which rotary motion is given, through a strap, from any first mover. This axle also carries a fixed pulley-wheel *d*, from whence an endless band is passed to a small pulley *e*, fixed upon a shaft *f*, at the opposite end of the machine. On this shaft *f*, a larger pulley *g*, is also fixed, from whence an endless band is carried over a pulley *h*, upon the hollow axle *i*, (see fig. 7,) which axle carries the die-box *k*, that holds the screw-blank, and turns it round, as in the chuck of a lathe.

A small pinion *l*, at the end of the axle *c*, takes into a toothed wheel *m*, on the cam-axle *n*; and a pinion *o*, on this axle, drives the two coupling-wheels *p*, *p*, which gives rotary motion to the drums *b*, *b*, as above described.

The spoon-end *m*, of the slider *l*, in the first instance, lies immediately under the discharging aperture of the groove *a*, and therefore, as the screw-blanks descend, they severally come into this spoon-formed receptacle.

In order to carry the screw-blank to the holders in the

die-box κ , κ , the sliding piece l , must be moved forward ;— this is done by a horizontal lever n , (see fig. 5,) moved by the rotation of a cam-wheel o , at the end of the axle $\mathfrak{N}$. The sliding piece l , and spoon m , with its spring-holder o , thus brings the screw-blank forward, and inserts its end into the open dies, in the box κ , on the hollow shaft $\mathfrak{I}$. When this has been done, a cam-wheel q , on the shaft $\mathfrak{N}$, gives a lateral movement to a lever r , which shifts a clutch-box s , on the hollow axle $\mathfrak{I}$, and causes the levers p , p , in the die-box, to expand and force the dies q , q , into close contact with the screw-shaft, as seen in fig. 7 ; and as this hollow shaft is made to revolve continually by the bands and pulleys g , and h , above described, the screw-shaft now receives a rapid rotary motion, as if fixed in the chuck of a lathe.

A vertical bar τ , having counter-sunk file edges, is now made to rise, in order to act against the face-edge and back of the head and upper part of the shaft of the screw-blank, as it revolves in the chuck. This file-bar τ , (see fig. 4,) slides vertically in sockets r , r , and is connected at bottom to a jointed lever v , v , v , the fulcrum of which lever is a stud, set in the side-frame at s . On the shaft $\mathfrak{N}$, a snail-cam u , is fixed, which acts against the bent extremity of the lever v ; consequently, as the snail-cam goes round, the opposite end of the jointed levers will rise and fall, and thereby move the file-bar τ , vertically up and down, and cause the irregularities of the shaft and head of the screw-blank, as it revolves, to be filed off.

The movements of the machine, which may be traced by the drawings, having caused the file-bar to descend, and the sliding-bar l , to retire, the spoon m , being then in a situation to receive another screw-blank, it is necessary to discharge from the chuck that one which has been turned.

This is done by the clutch s , having retired and opened

the dies of the box *k*, when a sliding-rod *t*, in the hollow axle *i*, is protruded forward, and drives the screw-blank out of the chuck. Upon the axle *n*, there is a cam-wheel *w*, in the groove of which, the end of a lever *x*, works. This lever turns upon a fulcrum-pin *z*, and the reverse end of the lever is attached by a clutch to the end of the sliding-rod *t*. Hence it will be perceived, that as the cam *w*, revolves, the rod *t*, will be projected, and the screw-blank discharged at the proper time.

The machine, in which the heads of the screw-blanks are to receive the cuts or nicks, is represented in the side elevation at fig. 8, and in the horizontal view at fig. 9. The headed and turned screw-blanks, from the last-described machine, are thrown into a hopper *A*, whence they fall upon the peripheries of the drums *B*, *B*, and are discharged thereon, in the manner already described.

Fig. 10, represents a detached portion of the machine, upon an enlarged scale, consisting of a part of the groove or channel *a*, *a*, in which the screw-blanks are brought forward, and of the notched wheel in which they are held, whilst under the operation of nicking. The position of these parts in the machine, will be seen by reference to fig. 9. *c*, is the first axle, driven by a band and rigger. Upon this shaft there is a pulley *D*, carrying a band, which drives the axle *E*. On the axle *E*, there is a pinion, taking into the teeth of the drum-wheel *B*, by which means the screw-blanks are delivered from the hopper *A*, and conducted into the groove or guide *a*, *a*, as before described. At the end of the axle of the drum there is a pinion *F*, taking into a wheel *G*, upon the axle *H*, and upon this axle *H*, there is also a pinion *I*, which drives a wheel *K*, on the axle of the notched wheel *L*, that receives and holds the screw-blanks whilst under the operation of notching or nicking. The first-mentioned axle *c*, has affixed upon it

a large pulley *M*, carrying a band that drives the pulley *N*, on the axle *O*; and this axle also carries a circular saw or cutter *P*, by the rotary action of which the nicks or notches, in the screw-heads, are cut. Rotary motion, therefore, being given to the shaft *C*, all the evolutions of the machine are performed, as follows:—

The screw-blanks being fed in and pushed forward in the groove or guide-passage *a, a*, they are, in succession, brought against the notched face of the wheel *L*; and as the wheel revolves, every notch or recess, in passing the end of the guide *a*, takes therefrom a screw-blank, and is assisted by a spring-slider *c*, occasionally projected forward, for the purpose of pushing the screw-blank into its notch, and keeping back the others from clogging the wheel. The movements of this spring-slider are effected by a rotary cam or tappet-wheel *d*, on the axle of one of the drums. These screw-blanks, as the wheel goes on, are confined in the notches by a steel spring *b*, which presses against the face of the wheel, and holds them securely. As the wheel *L*, turns slowly, the heads of the screw-blanks are made to pass under the circular saw or cutter *P*, which rotates rapidly above, by which means the nick or notch, in the heads of all the screw-blanks, as they pass, are cut with regularity and precision, and they afterwards drop out of the wheel into a receptacle below.

The machine, for cutting the threads or worms on the screw-shafts, is shewn in side elevation at fig. 11, and in plan at fig. 12; the hopper, drums, and feeding apparatus being removed in this figure in order to expose the mechanism for holding the screw-blank and threading it. Fig. 13, is a section in elevation, taken through the machine, in the transverse direction to fig. 11.

The hopper *A*, the drums *B, B*, and the means of feeding

the screw-blanks into the curved guide or feeding passage *a, a*, are, in this machine, the same as described above. The screw-blanks, therefore, are to be considered as fed into the machine, in consecutive order, through the guide-passage *a, a*, by which they are successively deposited in a recess in a socket *b*, below, (seen in section in fig. 14,) one screw-blank descending previous to every returning evolution of the holders and cutter.

The driving pulley or rigger *c*, is fixed upon a short axle *d*, (supported in suitable bearings,) carrying a pinion *e*, taking into a toothed wheel *f*, on the long axle or shaft *g*. At the reverse end of this shaft *g*, a toothed wheel *h*, is fixed, taking into a wheel *i*, on the short inclined axle that carries the rotary cutter *k*, by which the thread of the screw is to be formed on the shaft of the screw-blank. Near the middle of the long shaft *g*, there is a pinion *l*, taking into a wheel *m*, on the cam-shaft *n*; by this cam-shaft, many of the minor parts of the mechanism are actuated, and upon the same shaft also a pinion *o*, is fixed, which, by means of coupling-wheels, turns the feeding drums *B, B*.

One of the screw-blanks having passed from the guide *a*, lies in a horizontal position in the recess of the stationary hollow socket *b*, coincident with which the hollow axle *p*, must be brought, in order that the screw-blank may be projected through the hollow axle *p*, and brought to the holders against the rotary cutter *k*, at its opposite end. The means by which the screw-blank is projected, (point foremost,) is by a clutch and lever *c*, and spring *d*, acting upon a sliding-bolt or plunger *e*. The cam *f*, as its shaft goes round, causes the lever and clutch *c*, to draw back the bolt *e*; and when the elevated part of the cam *f*, has passed away from and ceased to hold the lever, the spring *d*, suddenly shoots the bolt *e*, forward, which projects the screw-blank into the hollow axle, see fig. 14.

The hollow axle *p*, with its appendages, is mounted in plummer-blocks, which slide horizontally, very short distances, to and fro, in transverse directions, in stationary frames *q*, *q*, standing across the machine; the hollow axle moving one way to receive the screw-blanks, and the other way to bring them against the rotary cutter. These sliding movements of the hollow axle *p*, are effected by a cam *g*, on the shaft *n*, acting against a lever *h*, which, by a strap-piece *i*, is connected to the plummer-block, seen in fig. 12. This cam *g*, is circular, excepting at one part of its periphery, which has a notch or recess cut in it; when, by the rotation of the cam, a tooth, extending from the lever *h*, is allowed to pass into the notch. The hollow axle is, by means of a lever, slid forward and brought into coincidence with the screw-blank, lying in the socket *b*; the plunger then acts as before described, and drives the screw-blank from the socket into the hollow axle *p*.

The whole length of the hollow axle having been filled with screw-blanks, either by hand or by these means, it will be perceived, that the act of introducing one in at the end next the plunger, will force the whole series of screw-blanks forward, and discharge the foremost one at the opposite end.

It is to be here observed, that in order to prevent more than one of the screw-blanks descending from the guides at each operation, a spring-tooth *l*, is passed into the recess under the guide-passage, which is drawn back whenever another screw-blank is required to descend by one of the elevations on the cam *m*.

In the section of the hollow axle, shewn at fig. 14, it will be seen, that the screw-blank, on being projected out of the axle, passes between a pair of lever-clips or chaps *n*, *n*, which are the holding dies. These chaps move upon pivots *o*, *o*, in the box or frame *r*, fastened on the end of

the hollow axle, and the head of the screw-blank prevents it from passing through the chaps when they are nearly closed. The shaft of the screw-blank being thus situated between the dies, the chaps are closed by the levers *p, p*, which are brought into a straight line through the agency of several strap-pieces and levers *q, q*, and *r, r*, and attached together, as shewn in figs. 11 and 12; and these are connected to a slider *t, t*, affixed to the guide-rods *u, u*. This slider *t*, is moved to and fro by jointed or infinite levers *v, v*, which are connected to the weighted lever *k*. The back part of this lever is bent upward, as shewn in fig. 13, and is acted upon by a wiper *w*, on the cam-axle, which, as it revolves, depresses the bent end of the lever *k*, and raises the opposite end, thereby bringing the levers *v, v*, into a straight line, for the purpose of forcing forward the slider *t*, and closing the chaps *n, n*. The screw-blank being thus firmly held between the chaps, the larger radius of the cam *g*, now acting against the lever *k*, forces it and the strap *i*, and plummer-blocks, which carry the hollow axle, into its back position, by which the shaft of the screw-blank is brought against the rotary cutter *x*, where it is held firmly. Rotary motion is now given to the hollow axle and its appendages, by a pinion *x*, at the end of the hollow axle, taking into the teeth of the wheel *x**, below, by which means the screw-blank, held in the chaps *n, n*, is made to revolve, with great rapidity, against the cutter or threading-tool *x*.

The periphery of the cutter or threading tool has helical grooves formed upon it, crossed by diagonal notches, in order to form cutting or file-teeth. The number of helical grooves, formed round the periphery of the cutter or threading tool, and its rotary speed, must be proportioned to the rotary speed given to the screw-blank under operation. When that is properly attended to, the thread or

worm will be properly cut upon the screw-shaft, and not otherwise.

The patentee claims, first, the construction of the several different machines or arrangements of mechanism, hereinabove described, for effecting the operations of cutting off the lengths of metal wire; heading the same so as to form screw-blanks or shafts; turning the shafts and heads, and nicking or notching them, by forming the slit therein; and, finally, cutting the worm or thread upon the shaft. Secondly, the novel means or mechanism for separating or extracting, severally, the screw-blanks or shafts from out of a promiscuous mass or heap, in a hopper, and guiding or conducting the same to the different subsequently required operations;—and also the novel and peculiar mechanism or means of cutting the thread or worm of the screws, consisting of the construction, form, and position of the rotary cutting-wheel or tool and its adjuncts, whereby the worm or thread is cut or produced upon the screw-shaft, as it revolves during this operation.—[*Inrolled at the Rolls Chapel Office, April, 1840.*]

Specification drawn by Messrs. Newton and Berry.

To ROBERT HAMPSON, of Mayfield Print Works, in Manchester, in the county of Lancaster, calico printer, for his invention of an improved method of block printing on woven fabrics of cotton, linen, silk, or woollen, or of any two or more of them intermixed, with improved machinery, apparatus, and implements, for that purpose.—[Sealed 9th June, 1840.]

IN Plate V., fig. 1, is a side elevation of a machine for block printing. A, is a roller or wooden cylinder, on which the woven fabric to be printed, is wound; and s, a similar

roller, provided with a length of calico or other cloth, to pass under the fabric, and protect the blanket during the printing process. *a, a*, represent carrier rollers, under the one and over the other of which the fabric and under-cloth are carried in their passage towards the printing table *B*, over which they pass.

The rollers *A*, and *s*, are both prevented from revolving freely, by means of a break or check line, and the counter-weights *b, b*, so that the fabric and under-cloth are held in a state of moderate tension as they are drawn forward over the printing table *B*. The position at which the impression is given to the fabric, is immediately over the letter *B*; whence the fabric passes forward over the roller *c*, and there separates from the calico or under-cloth, which passes between the roller *c*, and the pressing roller *c*, which is held in close contact with the under surface of the roller *c*, by means of the small levers and counter-weights *d, d*.

On the axis of the roller *c*, is placed the spur-wheel *E*, which receives motion from the pinion *e*, when made to revolve, by means of the handle or winch *F*. This handle or winch is arranged to make one revolution for every intended progressive movement of the fabric, having reference to the depth of the pattern or portion of the pattern intended to be impressed thereon, and is held stationary, during the printing operation, by a small spring-catch *f*.

The amount of revolution imparted to the wheel *E*, necessarily depends on the relative size of the pinion *e*, which can be changed when required, so that as soon as one impression has been received on the woven fabric, at the point *B*, a uniform amount, in length, of the fabric, corresponding with the amount printed, is drawn forward by the revolution of the cylinder *c*, and a fresh portion of the fabric presented to the printing operation.

After the fabric has received the impression from the

block, and passed forward over the roller *c*, it is carried over a heated plate *d, d*, for the purpose of drying it, and thence forward under the carrier rollers *g¹, g¹*, then over the pressing roller *c*, and under or over such carrier rollers as may be convenient, until it is deposited, printed, and in a dry state, on the roller *R*.

The heated surface *d, d*, for the purpose of drying the printed fabric, is produced by a constant flow of hot water or steam within a chamber, of which *d, d*, forms one side; but the mode of heating may be varied, according to the nature of the fabric to be printed.

The block *a*, from which the impression is received on the fabric, is suspended immediately over and parallel to the table *B*, where it is attached to the cross-frame *g, g*. This frame is guided and kept horizontal in its ascent and descent within the strong upright frame of the machine *x, x*, by means of the centre rod *H*, and is suspended in its present position by means of the band *i, i*, and counter-weight *r*; so that, by raising the counter-weight *r*, the cross-frame and block descend by their own gravity, and the block imparts the pattern to the fabric on the table below, returning to the position represented, as soon as the weight *r*, is drawn down by the operator.

The apparatus for distributing the colour to the block *a*, is represented at *K*, and moves on the railway *L, L*. In the drawing it is shewn immediately under the block *a*, preparatory to the block being depressed to receive the colour, and in dotted lines, in the position to which it would be removed before the block again descended to impart the pattern to the fabric below.

The construction of this part of the invention will be seen in the detached figures, where figs. 2 and 3, represent plans, and figs. 4 and 5, transverse sections of a colouring apparatus, for distributing six colours to the block at one

operation. In these figures *m, m, m*, represent eight compartments or small cisterns, in which the liquid colours are contained, ready for distribution on the surface of their respective sieves or elastic surfaces *M, M, M*.

The six parallel boxes or cisterns, under the sieves *m¹, m¹, m¹*, are supplied, at their respective openings, *n, n, n*, with the requisite amount of liquid to keep them elastic, and are supported on two straight edges *o, o*. The first sieve-box is stationary, but the other five can be separated by means of the bent irons *q, q*, which are attached to the last sieve, and the amount of separation or distance from each other, at which they are held, is determined by means of a strap of leather *p, p*, (see figs. 4 and 5,) attached to the under side of all the sieve-boxes or cisterns.

Fig. 6, is a plan, and fig. 7, an elevation of a feeder or implement for distributing the colour from the colour cisterns *m, m, m*, into the sieves *M, M, M*. This feeder consists of a series of wooden pegs, fixed in and proceeding from the under surface of a slab of wood, and so placed as to correspond with the respective colour cisterns, so that, by lifting the feeder out of the colour cisterns, and placing it on the sieves, when in the position represented at fig. 2, a regular amount of colour is carried to each, and the dipper, being returned to the colour vessels, remains ready for the next operation.

Fig. 8, represents a tearing brush or rubber *y*, with two handles, which is to be placed in a trough, made for its reception, as seen at fig. 3, when not in use; and is shewn in elevation, as when in use at fig. 4. This brush or rubber is for tearing or spreading the colour uniformly on the surface of the respective sieves, and is divided into spaces to correspond with the sieves when separated, as in fig. 2. The colours having been distributed, by means of the dipper, fig. 7, and spread or teared by the brush, the

colouring apparatus is passed along the railway *L, L*, under the block *G*, where the projections *q, q*, coming in contact with the upright framing of the machine, the several sieves *m, m, m*, are pushed together or closed, as seen at fig. 3, and are then in a position to correspond with the several portions of the pattern on the block *G*, which are to receive the several colours. In this apparatus, the colour being distributed in straight lines, the pattern on the block *G*, must necessarily partake of the same character; but, by variations in the form of the sieves, patterns of a different character may be produced.

Fig. 10, is a modification of the colouring apparatus, in which, by the sieves being made with projections or indentations, filling into each other, alternate colours would be imparted to the block when the sieves were closed, and the block brought into contact therewith; whereas, in the former construction, it would be the same colour throughout. But this and other modifications of the colouring apparatus, according to the nature of the pattern to be produced, will be obvious to any party conversant with printing operations,—a principal advantage in the method described, of distributing and tearing the colour, depending on the moveable arrangement of the sieves, which allow of the near approximation of different colours in the pattern, without endangering their admixture during the process of distribution and tearing.

Fig. 9, is an elevation of a brush for cleaning the block *G*, when required, which, by moving accurately on the edge of the colouring apparatus, comes in contact with every part of the block on which any part of the pattern is raised, the block being sufficiently lowered for this purpose when required.

The following figures represent a modification of the colour-box, adapted to the employment of a printing block,

of the ordinary size, to be used by hand, either before or after dyeing, or other process, by which the texture of the fabric to be printed has been stretched, contracted, or otherwise varied, in the same manner as block printing is ordinarily performed, and when the object could not be properly or conveniently effected by a block, covering the whole width of the fabric, as already described.

Fig. 11, is a plan of the colour-box; fig. 12, is a transverse section of the same, taken at the line *t, t*, fig. 11; and fig. 13, a transverse section, taken at the line *w, w*, fig. 11.

The position of the sieves, when closed and ready to receive the block, is shewn at fig. 11; but when not in use, they are placed as shewn in section at fig. 12.

It will be remarked, that in the colouring apparatus, before explained, the tearing or spreading of the colour was described as performed lengthwise, from end to end of the sieves. In the present modification it is performed across or at a right angle to the longest side of the sieves, which are divided into compartments by small bands or raised divisions, placed across the sieves, to prevent the intermixture of different colours placed on the same sieves.

The various colours are placed in compartments, marked *m, m, m*, and each is sub-divided into a variety of small cells, to contain colours and shades of colours. Thus, at one impression of the block, six or more separate colours are placed on the fabric, and the rainbowed effect produced and intermixed to a greater extent than has heretofore been effected.

The patentee claims the method, hereinbefore set forth, of printing with blocks on woven fabrics of cotton, linen, silk, or woollen, or of any two or more of them, intermixed by means of such machinery, apparatus, and implements, as hereinbefore described; and also the combination and

arrangement of mechanical agents and contrivances hereinbefore described, whereby the block is caused to descend in a perpendicular direction, and with its face parallel to the printing table, in order first, to take up the colour from the sieve or sieves, and secondly, to impress the pattern or design on the fabric to be printed.

And he likewise claims the colouring apparatus, as hereinbefore described, in which several sieves are separated and held apart to admit of the several colours being distributed and teared or spread thereon without admixture, or interference one with another, and whereby the sieves are afterwards closed or brought into juxtaposition, in order to the colours being taken up by the block, so as to produce, at one impression of the block, a pattern or design, or parts of a pattern or design, in several colours, arranged contiguous or near to each other.—[*Inrolled in the Inrolment Office, December, 1840.*]

To ELISHA OLDHAM, of Cricklade, in the county of Wilts, rail-road contractor, for his invention of certain improvements in the construction of turning tables, to be used on railways.—[Sealed 8th February, 1841.]

THIS invention of improvements in the construction of turntables, consists in mounting the platform or table, at its centre, on an upright pin or pivot, the sides of the platform or table being supported by stationary anti-friction rollers, when a heavy weight is brought on to it.

In Plate V., fig. 1, represents a plan view of the apparatus complete, with the rails affixed thereon; fig. 2, is a side view of the same; and fig. 3, is a transverse vertical section of the apparatus, shewing the manner in which the

platform is supported. The method of lubricating the centre bearing of the turn-table is also seen in this figure.

Figs. 4 and 5, represent a modification of the above turning-table; fig. 4, being a plan view of the apparatus, with the platform removed, and fig. 5, a section of the same. The only difference between this construction and that shewn in the former figures, is, that the anti-friction rollers are brought nearer to the centre in this than in the other. *a, a, a*, is the moveable platform table or plate, as it is sometimes called, and *b, b, b*, the rail affixed thereto. The centre pin or pivot, on which the platform revolves, is shewn at *c*, in fig. 3. It is lubricated with oil or other suitable material, through the medium of the aperture *d*, made in the platform, immediately above the centre. This chamber, when supplied with lubricating material, is closed by means of a screw, or in any other convenient manner. The upper platform *a*, consists of a strong cast-iron framing, the interstices of which are filled up with wood or other suitable material.

The extreme edge of the circular platform is supported by eight iron anti-friction rollers *e, e, e*, which are mounted in stationary bearings, made of either steel or brass. These bearings are fixed to the stationary cast-iron framing *f, f, f*, and as the upper platform is turned round on its centre, it touches the anti-friction rollers *e, e*, on either side, according to the situation of the superincumbent weight; but when the platform is properly balanced, it rests entirely on the centre pin, which is therefore made sufficiently strong to support it; or if the weight is unevenly placed on the platform, then one side thereof is sustained by the stationary anti-friction rollers, which revolve on their own centres, and allow the platform to slide over them.

The lower framing of the turn-table, or that which supports the moveable platform, should be set in a bed of con-

crete, and in order to prevent it from sinking or yielding, a block of wood may be placed immediately under the centre, as seen in the drawing, that being the part where the greatest strength is required.

The patentee claims the arrangement of parts herein shewn, as applied to the construction of turn-tables, or any other arrangement in which the moveable platform is supported on a pin or pivot at its centre, and assisted by stationary anti-friction rollers at its sides, in the manner above described.—[*Inrolled at the Petty Bag Office, August, 1841.*]

Specification drawn by Messrs. Newton and Berry.

To GEORGE TOWNSHEND, of Sapcote Fields, in the parish of Sapcote, in the county of Leicester, Esq., for his invention of improvements in machinery or apparatus for cutting certain vegetable substances.—
[Sealed 29th April, 1841.]

THIS invention is a novel apparatus for cutting turnips or other vegetable matters into small pieces, for feeding sheep and other cattle; and may be actuated by hand labour or other power, or may be so adapted to a cart, that its progress, in passing over the ground, may be made the actuating agent to work the machine, and at the same time, cause a distribution of the cut pieces of turnips or other vegetable matters, over the surface of the field, in such order as may be desirable for the cattle to pick up when feeding.

In Plate V., fig. 1, represents the cutting apparatus, placed upon a wooden frame, as it would be constructed if worked by hand; fig. 2, is a horizontal or top view of the same. In the first figure, the apparatus is shewn in section,

taken perpendicularly through about the middle of the machine; in the second, the box or feeding hopper is removed, in order to represent the cutting apparatus below. Fig. 3, is a horizontal view of the circular rotary plate which carries the knives; and fig. 4, is a section of the cutting apparatus, taken vertically at a little distance in advance of the axis of the circular plate, in the position of the dotted line in fig. 3. Both these figures are drawn to a scale twice the size of figs. 1, and 2.

A wooden frame *a, a*, supports the short perpendicular shaft *b*, upon which the horizontal circular plate *c*, is made fast. This plate *c*, has two curved apertures cut through it, as represented in fig. 3, and in these apertures are placed series of vertical knives *d, d, d*, which are set in frames, made fast to the under surface of the circular plate, by screws or otherwise. The form of each of these knives is shewn at *d*, in fig. 4.

To the upper surface of the circular plate, two horizontal knives *e, e*, are attached. These knives are curved and of a wedge form, and are fixed at their ends upon inclined planes as bearings, for the purpose of slightly elevating their cutting edges, and extending them over the upper edges of the vertical knives, as seen in figs. 1, and 4.

Immediately over the circular rotary knife-plate *c*, there is affixed to the wooden frame a transverse bar *f, f*, with a similar bar *g*, connected thereto, at a right angle to the former; which bars stand inclined at a considerable angle, in order to form recesses and stops to receive the turnips, and hold them whilst they are acted upon by the rotary knives *d, d*, and *e, e*. These rotary knives being affixed to the horizontal plate *c, c*, go round with it, the plate being turned by a winch and axle *h*, carrying a bevil pinion *i*, which takes into a bevil pinion *k*, on the short perpendicular shaft *b*, which supports the plate *c*. Over this

apparatus is placed a hopper *l, l*, bearing upon a wooden frame *a, a*; the openings at the bottom of which hopper, for the delivery of the turnips or other vegetable substances, is formed and regulated by moving shutters *m, m*.

The hopper being filled with turnips or other vegetable matters to be cut, the shutters are partially drawn up, so as to allow the turnips, &c., to fall through on to the rotary plate *c*, in the space *n, n*, where, as the circular plate revolves, the turnips or other materials to be cut, are carried round and brought under the inclined bars or stops *f*, and *g*, by which the horizontal knives *e, e*, are made to cut the materials into slices, and to force those slices down against the edges of the series of vertical knives *d, d*. By these means, the slices are cut into small pieces, which pieces fall between the knives into a receptacle below, in a condition fit to be supplied to the cattle for food.

The second feature of the invention, viz.—the means of actuating a machine for cutting turnips and other vegetables, by the progress of a wheeled carriage over the ground, and at the same time distributing the cut pieces over the field, is shewn in the following figures:—Fig. 5, is an end elevation of a cart, with the cutting apparatus attached thereto; and fig. 6, is a side elevation of the same portions of these figures, being drawn in section, to shew the machinery more clearly.

^ Affixed to the inner side of the cart wheel, is a toothed rim or concentric circle of teeth *p, p*, which may be made fast to the spokes or the nave. This circle of teeth takes into a pinion *q*, on the driving axle *h*; hence, as the cart passes over the ground, motion is given to the cutting apparatus, and the same effect is produced as if actuated by hand, except that, as the cart moves onward, the pieces of the cut vegetables, instead of being delivered into a receptacle below, are dropped through the circular plate

between the vertical knives, and distributed over the ground.

In order that the turnips or other material may roll down to the feeding apertures, it will be necessary to tilt the body of the cart a little; this may be done, when required, by means of a winch and pinion *r*, acting in a vertical rack *s*, seen appended to the front part of the cart. And in order that the cutting apparatus, so appended to the cart, may remain inactive during the time that the cart is loading, and being led into the field, a clutch lever *t*, and rod *u*, at the back part of the cart, is applied, for the purpose of throwing the pinion *q*, in or out of gear with the toothed rim *p*, by sliding the pinion laterally upon the axle or shaft *h*.

The patentee claims the construction of apparatus, above described, for cutting vegetables for the food of cattle, and also the means of actuating that, or any other modification of apparatus for cutting vegetables by the progress of a carriage, and distributing the pieces, so produced, over the field, as described.—[Inrolled at the Petty Bag Office, October, 1841.]

Specification drawn by Messrs. Newton and Berry.

To JOHN RIDGWAY, of Cauldon-place, in the county of Stafford, china manufacturer, for certain improvements in the moulds used in the manufacture of earthenware, porcelain, and other similar substances, whereby such moulds are rendered more durable.—[Sealed 11th January, 1840.]

THESE improvements in moulds used in the manufacture of earthenware, porcelain, &c., consist in the union or combination of two suitable substances, to form the mould.

The face which gives the shape or form to the article to be moulded, is composed of a thin layer of the substance

usually denominated "pitcher," a mixture composed of eight pounds of flint, two and a half pounds of blue clay, and one pound of china clay, more or less, as may be found most desirable; these ingredients, when baked, are to be strengthened by a composition back, consisting of three parts of sand, two of Roman cement, and one of plaster of Paris; the whole mixed with water, whereby, after standing, it becomes hard and durable. The union of these two substances, to form the mould, will allow it to receive any form or size most convenient for use.

For the sake of illustration, drawings of a mould are shewn in Plate VI., in which fig. 1, is a face view, and fig. 2, a section. The pitcher-face is represented at *a, a, a*, and the composition back is shewn at *b, b, b*.

The patentee does not confine himself to the exact proportions or materials, either of the pitcher-face or of the composition back for moulds, as it may be necessary to vary the same, in order to suit convenience; but he claims the union or combination of the two parts constituting a "pitcher"-face, and a composition mixed or metal back, to form moulds used in the manufacture of earthenware, porcelain, and other similar substances.—[*Inrolled in the Rolls Chapel Office, July, 1840.*]

Specification drawn by Messrs. Newton and Berry.

To JOHN RIDGWAY, of Cauldon-place, Stafford, china manufacturer, and GEORGE WALL, the Younger, of the same place, Gent., for certain improvements in the manufacture of china and earthenware, and in the apparatus or machinery applicable thereto.—[Sealed 11th January, 1840.]

THESE improvements in the manufacture of china and earthenware, consist in employing a pair of ordinary double

moulds or dies; that is, exterior and interior, for forming the articles of manufacture, and pressing such moulds or dies together, to complete the operation, by means of self-acting machinery, to be actuated by steam or other power.

The principal object of this invention is to perform the several processes of feeding the press, closing the dies to form the article to be manufactured, and removing or delivering the moulds containing the articles so formed, by means of self-acting machinery or apparatus, instead of manual labour.

In Plate VI., fig. 1, is a side elevation, and fig. 2, a front or end elevation of a machine, adapted for such purposes. The main framing or side standards are shewn at *a, a, a*, supporting the press or head-framing *b, b, b*. The main or driving-shaft *c, c*, is mounted in the frame *a, a*, carrying the driving-pullies *d, d*, the fly-wheel *e*, and also the driving-pinions *f, f*; conducting or tension-rollers *g, g*, are also supported by the main framing, and another tension-roller *h*, is supported by a bracket, at any suitable distance. The rollers *g*, and *h*, are for the purpose of conducting the feeding or delivering strap or band *i, i*, which carries the pair of moulds or dies *k, k*, through the machine. The head-framing *b, b*, is furnished with planed parallel sides *l, l*, for the press-table *m*, to rise and fall in, and also with the set-screw *n*, for the purpose of adjusting the press-head *o*, and thus regulating the pressure upon the moulds or dies *k, k*;—the press-head *o*, or the press-table *m*, being furnished, if necessary, with springs, to give elasticity to the pressure. A cross-shaft *p*, is also mounted in the head-framing *b, b*, which carries at its end the toothed wheel *q*, gearing with one of the driving-pinions *f*, and thus actuating the cam or excentric *r*, which is keyed upon the middle of the shaft *p*, and as it revolves acts against a projection *s*, upon the under-side of the press-table *m*.

The general construction of the apparatus being now

explained in detail, the operation of the same is as follows:—Supposing power to be applied from a steam-engine or other mover, by means of a strap being passed around the fast pulley *d*, or in any other convenient manner, and a pair of moulds or dies *k*, placed upon the feeding strap *i*, *i*, with a bat of clay between them,—one of the driving pinions *f*, will actuate the spur wheel *t*, upon the smaller cross shaft *u*, and thus, by means of the crank *v*, and connecting rod *w*, vibrate the radial arm *x*, which, being connected with the carrier piece *y*, will slide it along the two guide rods *z*, *z*, and cause the catch wheels 1, 1, to strike against the stops 2, 2, upon the strap *i*, and thus turn the catch wheel one fourth of a revolution, when the hooked catches upon it, will pull against the stops, and, as the sliding carrier *y*, *y*, returns by the next vibration of the arm *x*, will thus cause the strap *i*, *i*, to advance a certain distance, until the moulds *k*, *k*, are brought exactly under the centre of the press, when the pin or catch escapes from the stop upon the strap *i*, *i*, and thus leaves it stationary; at this time the excentric part of the cam *r*, will arrive at the perpendicular, and, by acting against the projection *s*, upon the under-side of the table *m*, thus force the table upwards, giving the requisite pressure to the mould *k*, *k*, and cause the clay between them to be impressed with the form or shape required. After the pressure has been performed, the strap again advances as before, and conducts the moulds, with the article thus formed, into the room to be properly dried and finished.

It will be evident, that as the driving parts continue to revolve, the alternate operations of feeding in the moulds, properly supplied with clay, pressing them to form the article of manufacture, and removing them from the machine, will thus be successively performed.—[*Inrolled in the Rolls Chapel Office, July, 1840.*]

Specification drawn by Messrs. Newton and Berry.

To BENJAMIN RANKIN, of College-street, Islington, Gent., for a new form and combination of, and mode of manufacturing blocks for pavement.—[Sealed 27th April, 1841.]

THESE improved blocks are of an entirely different form to those which have hitherto been used for paving, and are manufactured out of long pieces of timber, four inches square.

In plate VI., fig. 1, is a transverse section, and fig. 2, a side view of part of one of the pieces of timber. In one side of the piece, two longitudinal grooves *a, a*, are ploughed by a planing machine, and on the opposite side, two longitudinal tenons or beads *b, b*, are worked; the piece of timber is then formed into blocks by transverse cuts, in the direction of the dotted lines in fig. 2. The blocks are of two sorts, base blocks, and surface blocks; the former are chamfered at the edges of their bases, and have their points or apices cut off, as shewn in fig. 3; the latter are chamfered at the edges of their bases only, (or rather at those edges which will be uppermost in the pavement,) as shewn in fig. 4. Fig. 5, shews the mode of laying down these blocks to form a pavement. The base blocks *c, c, c*, are first laid; the tenons *b, b*, fig. 1, of each block, entering the grooves *a, a*, of the two adjoining blocks, and into the spaces between the upper ends of the base blocks; the surface blocks *d, d, d*, apex downwards, are inserted, their tenons entering the grooves of the surface blocks, and their grooves receiving the tenons of the latter. Along the centre of the street a row of square blocks are laid, and at each side of the pavement, near the curb, iron box blocks, with a grating in the upper part, are placed at intervals. The upper parts of the surface blocks *d*, pro-

ject above the upper parts of the base blocks, and present a secure foot-hold to horses and other animals. If preferred, grooves may be cut across the pavement, instead of the upper edges of the surface blocks being chamfered.

The patentee claims, Firstly,—the peculiar forms of blocks, with side grooves and tenons, as above described.

Secondly,—The combining of such blocks to form a pavement, by the side grooves and tenons, as above described.

Thirdly,—The manufacturing of the blocks out of long pieces of timber, grooved and tenoned in one length, and afterwards cut transversely, and at certain angles, so as to form the said blocks, as above described.—[*Inrolled in the Inrolment Office, October, 1841.*]

To JOHN WALKER, of Crooked-lane, King William-street, builder, for an improved hydraulic apparatus.—[Sealed 8th March, 1841.]

THIS invention is for the purpose of raising water, either in intermittent jets, or in a continuous stream.

In Plate VI., fig. 1, is a vertical section of the improved hydraulic apparatus; *a, a*, being a metal pipe or tube, from six to twelve feet long, by an inch and a half in diameter, for about two-thirds of its length from the bottom; the remaining third gradually diminishing to half an inch. The lower end of the tube is formed into a bell or dome *b, b*, provided with a valve *c*, opening upwards; the passage through which is of the same area as the two lower portions of the tube. On the upper end of the tube an elbow-pipe *d*, is screwed, when the apparatus is used for raising water into a cistern; but when employed for watering plants, or

used as a fire-engine, a nozzle or jet-pipe *e*, fig. 2, is screwed on the top of the tube *a*, in place of the pipe *d*.

The action of the apparatus is as follows:—The lower end of the tube is immersed in the reservoir from which the water is to be raised, and the tube being caused to assume a vertical or inclined position, is worked up and down with a jerking motion. Each stroke causes a quantity of water to enter the tube *a*, through the valve *e*; and when the former is full, every succeeding stroke will force a jet of water through the elbow-pipe *d*, to a distance of thirty feet.

When the water is required to be raised and discharged in a continuous stream, the upper end of the tube *a*, is connected by a flexible tube, with a stationary air-vessel, that end of the tube which is inserted into the air-vessel being closed by a valve opening upward, into which the intermittent jets are collected, and the air in it being thus condensed, will, by its re-action, force the water through a discharge-pipe, attached to the air-vessel, in a continuous stream.—[*Inrolled in the Inrolment Office, Sept., 1841.*]

To RICHARD COLES, of the Town and County of Southampton, slater and slate merchant, for improvements in making or manufacturing tanks and other vessels, of slate, stone, marble, and other materials, and in fitting and fastening such materials together.—[Sealed 23rd December, 1840.]

THIS invention consists in certain improved methods of fastening or attaching together slate, stone, marble, &c., when used for the construction of tanks or vessels, whereby greater strength is obtained.

The ordinary manner of connecting together the several parts of which tanks are composed, when the above-mentioned materials are employed, is as follows:—The sides and bottom of the tank or other vessel, are either screwed together or fastened together with dowels, and the joints well cemented, in order to render them water-tight. When either of the above methods are employed, the whole weight of the water, contained in the vessel, acts upon the small portion of the material, supported by the screws or dowels, which, if the weight be considerable, is liable to give way.

The object of this invention is to distribute, more equally, the strain occasioned by the weight of the contents of the tank, and it is effected in the following manner:—

The pieces of material, of which the tank or other vessel is to be constructed, having been cut into the required form and size, a square groove is made in each of the slabs intended for the bottom and sides of the tank, at about an inch from their outer edges, as seen in Plate VI.—fig. 1, being a plan, and fig. 2, a section of the same.

In the internal angles of this groove, a number of small holes are bored, about a quarter of an inch deep and three inches apart; and the edges of the sides and ends of the tank having been prepared, and made of a proper thickness to fit the square groove of the bottom slab easily, another groove is cut along both sides of their edges, either square or curved, as seen in fig. 3; and when the several parts are brought into their proper places, the cavities formed by the grooves and holes, are filled up with molten metal, (see fig. 4,) which, when cold, effectually holds the parts together, the joints being afterwards made perfectly water-tight, by means of a cement of white and red lead. Sometimes the sides and bottom are made flush, as in fig. 5, instead of leaving a projecting part, as in fig. 4.

Another method of connecting the sides and ends to the

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bottom, is by forming a dove-tailed groove along two opposite sides of the bottom slab ; and after preparing the bottom edges of the corresponding side-slabs, these latter are slid into the groove formed in the bottom slab, and by that means tend to support it, as shewn in fig. 6. The end slabs may be fixed in their proper places, in the manner shewn at figs. 1, 2, 3, 4, and 5, and the joint made watertight by white or red lead. By these means, a tank or vessel can be formed of any square or angular shape, and will be found to be much stronger than when constructed in the ordinary manner, as the strain, occasioned by the weight of the contents, is more equally distributed throughout the joints.

The patentee claims, firstly, the method above described, of constructing tanks and other vessels of slate, stone, marble, and other materials, whereby an increased degree of strength is obtained from the more perfect union or connection of the parts; secondly, the application of molten lead or other metal in the cavities formed by the holes and groove before mentioned, for the purpose of effecting such increased degree of strength; and thirdly, the method shewn in fig. 6, of suspending the bottom slab by means of a dove-tail, formed on the lower edge of the side-slab, and taking into a corresponding groove, made in the bottom slab, as before described.—[*Inrolled at the Petty Bag Office, June, 1841.*]

Specification drawn by Messrs. Newton and Berry.

To JOSEPH BARKER, of Regent-street, Lambeth, in the county of Surrey, artist, for improvements in measuring æriform or fluid substances.—[Sealed 20th April, 1841.]

THIS improved meter consists of a hollow cylindrical vessel, provided with a moveable internal partition or piston,

which is caused, by the passing fluid, to traverse to and fro in the cylinder, and thus communicate, by means of certain intermediate levers, a reciprocating action to the valve or tap which admits the fluid into the apparatus; whilst, at the same time, the central or piston rod is caused to actuate the counting wheel-work, in order to register the quantity of aeriform or fluid substance which has passed through the apparatus.

In plate VI., fig. 1, is a side elevation of the apparatus; fig. 2, a vertical section, taken through the same; and fig. 3, an end view of the apparatus, having the clock or wheel-work removed. *a, a, a, a*, is a cylindrical vessel or chamber, which may be made of any capacity, according to the purposes to which the meter may be applied, supported upon a framing *b, b*.

In this cylinder a partition or piston *c, c*, works to and fro, as in the ordinary steam-engine; this piston *c*, is provided with a piston rod *d, d*, cross head *e, e*, and side links, rods, or levers *f, f*, which slide or work in guide or parallel bearers *g, g*, attached to the side of the cylinder *a, a*.

The gas, water, or other substance to be measured, enters through the pipe *h, h*, passes around the hollow belt or passage *i, i*, into the tap or valve *k, k*, and from thence, by either of the pipes *l, l*, is admitted into the cylinder *a, a*, upon either side of the piston, alternately.

The side links or rods *f, f*, attached to and travelling with the piston, are furnished with stops or studs *m, m*, which come into contact and strike the vibrating levers *n, n*, at every stroke or passage of the piston, and thus force over those levers which swivel upon their fulcra at *o, o*, until they strike against either of their pins or studs *p, p*, fixed into the plates or discs *q, q*, below.

These plates are attached to the valve or tap *r, r*, (see the sectional fig. 2,) and thus it will be perceived, that as

the piston works to and fro in the cylinder, by the pressure of the fluid or other substance passing into the cylinder, at either side alternately, the reciprocating motion of the piston is caused to shift the angle or position of the valve or tap *r, r*, and thus open the passages of either of the pipes *l, l*, and convert them into exit or entrance passages for the fluid, alternately, as required; the fluid passing off at the pipe *s*, below.

It will be seen, that as the gas or fluid passes, alternately, into either end of the cylinder *a, a*, forcing the piston to and fro, a reciprocating action is imparted to the double toothed rack *t, t*, attached to the end of the piston rod, and as this rack travels to and fro, its upper and under side work, alternately, into the wheel *u, u*. This wheel having teeth upon part only of its periphery, (the other part being blank,) is caused to revolve, by each rack alternately taking into the teeth on its rim, as the other rack delivers or presents them to its successor.

Rotary motion being thus imparted from the piston to the wheel *u*, a pinion, upon its axis, communicates the motion to the ordinary count wheels or clock-work, and the registry of every stroke of the piston is effected.

In some extreme cases, where the pressure of the gas or fluid is not sufficient to move the piston to and fro, an ordinary clock spring may be attached in a barrel, as at *v*, having a band or chain communicating with a fusee, and, by means of the intermediate wheel *u*, may thus be made to assist the action of the fluid; or the auxiliary apparatus may be further employed for the purpose of forcing.

The patentee claims the improvements in measuring æriform or fluid substances, as exhibited in the drawings.
—[*Inrolled in the Petty Bag Office, October, 1841.*]

Specification drawn by Messrs. Newton and Berry.

To ROBERT ROBERTS, of the Township of Bradford, near Manchester, in the county of Lancaster, blacksmith, for a new method or process of case-hardening iron. —
 [Sealed 25th November, 1840.]

THIS invention consists of a new mode of combining or uniting wrought-iron with cast-iron, by which wrought-iron, of any manufactured form or dimensions, may be readily case-hardened.

In order to perform the operation of case-hardening iron, according to this process, an ordinary furnace is prepared, in which is placed a vessel or compartment, to contain cast or molten iron, heated and molten by the furnace, in such a state as it would be used for running or casting into moulds. In the same furnace is placed, in a separately heated chamber or compartment, the article of wrought-iron intended to be hardened, say (for the sake of illustration) the tire of a wheel. The furnace may be of any form or dimensions, suitable to the shape and size of the wrought-iron to be hardened. The furnace being closed, and the cast-iron in a state of fusion, the wrought-iron tire must, when at a complete red heat all over, be lowered into the fluid cast-iron in the vessel, chamber, or compartment below, and gently rolled or turned round in it, when the cast-iron will completely case over the wrought-iron tire with any required thickness of cast-metal, from one-sixteenth to half an inch, more or less, which, upon being removed from the furnace, and immediately immersed in cold water, will be entirely case-hardened or steeled.

It will be necessary to observe, that the iron, as it comes out of the furnace, should be so immersed in water, that its entire surface be covered by the water at the same time, in order to prevent any irregularities in the con-

traction of the metal. Great elasticity and strength may also be given to bars or strips of wrought-iron, thus case-hardened; and carriage and other springs may be made in this manner.

The patentee claims the method or process of case-hardening iron, by coating, covering, or combining wrought-iron with cast-iron, as herein set forth.—[*Inrolled at the Petty Bag Office, May, 1841.*]

Specification drawn by Messrs. Newton and Berry.

To JOSEPH APSEY, of Cornwall-road, Lambeth, engineer, for improvements in the construction of flues for steam-engine boiler and other furnaces.—[Sealed 6th April, 1841.]

THESE improvements consist in making the flues surround nearly the whole outer surface of the boiler, the outlet into the chimney being at a point below the water-line of the boiler; by which means, although the flues are above that line, the rush of the flame, heated gases, &c., will not be higher than the outlet into the chimney, all above that outlet being a stagnant heated atmosphere. Thus, any injury that the metal of the boiler, above the water-line, would sustain, if the rush of flame to the chimney was above that line, is prevented.

The patentee claims the mode of constructing flues of steam-engine and other boiler furnaces, whereby the same are carried above the water-line of the boilers, and the outlet into the chimney is found below the water-line of the boilers, as above described.—[*Inrolled in the Inrolment Office, October, 1841.*]

To JOHN BETHELL, of Mecklenburgh-square, in the parish of St. Pancras and county of Middlesex, Gent., for certain improvements in rendering wood, cork, leather, woven and felted fabrics, ropes and cordage, stone and plasters or compositions, either more durable, less pervious to water, or less inflammable, as may be required for various useful purposes.—[Sealed 11th July, 1838.]

THIS invention of improvements in rendering wood, cork, leather, woven and felted fabrics, ropes and cordage, stone and plaster, or compositions, either more durable, less pervious to water, or less inflammable, as may be required, consists in impregnating such articles with various mixtures or solutions, so that they may be saturated throughout, and thus rendered either more durable, less pervious to water, or less inflammable, according to the different mixture or solution with which they are impregnated.

The apparatus used for this purpose, is an air and water-tight vessel or tank, made of strong metal, of any form that may be preferred, (one made like the circular wrought-iron boilers for high-pressure steam-engines answers very well,) strong enough to withstand an internal pressure of two hundred pounds to the square inch, having a lid or door to it, which is made to screw on air-tight. The tank is fitted on the top with a common steam-boiler safety-valve; and it is connected by one pipe, having a stop-cock or valve in it, with an exhausting air-pump, and by another pipe, likewise fitted with a stop-cock, with a pump for forcing liquids into the tank, made like the pumps for forcing water into hydrostatic presses.

The articles to be impregnated are put into the tank, and the lid screwed on air-tight; the cocks in the pipes, leading to the pumps, being shut, the tank is then filled

with the desired mixture or solution, through a pipe, having a stop-cock in it, which is then shut, and the cock, in the pipe leading to the air-pump, being opened, that pump is set to work for the purpose of exhausting the air from the tank, and also out of the pores of the various articles placed therein; after which the liquid mixture or solution will penetrate into and fill up those pores, more particularly if the tank is kept heated, which may be done in any convenient manner; but for some articles this may not be found sufficient; and, in such cases, the air-pump, after having exhausted the tank, is stopped, the cock or valve shut, and the liquid force-pump set to work, (its cock being previously opened,) to force some of the same mixture or solution into the tank, until the required degree of pressure is obtained.

The working of the liquid forcing pump must be repeated every one or two hours, as the articles, by absorbing the mixture or solution, cause the pressure to diminish. The degree of pressure, to which it is determined to work up to, is regulated by loading the safety-valve with the appropriate weights, and as soon as the pressure of the condensed liquor exceeds the weight on the valve, the liquid is forced out of the valve, and the pressure within reduced.

In impregnating wood, by this apparatus, the process is much expedited by placing the logs of wood in the tank, in a perpendicular or slanting position, so that the butt ends of the logs may be at the bottom of the tank, and their upper ends a little above the surface of the liquid. In this case, as soon as the exhausting process is commenced with the air-pump, the air travels freely up the longitudinal pores of the wood, and the liquid follows it, entering into the bottom or butt end of the log, and following the air, as it is drawn out of them at the top by the air-pump.

It may not be necessary, with some very porous articles, to use both the processes of exhausting the tank of air, by the air-pump, and forcing in the liquids by the hydrostatic force-pump; but either one or the other of the processes, as is most convenient, may be used, and will be found to impregnate the articles sufficiently.

The form of apparatus, above described, is that which is most preferred; but it is evident, that the pressing or forcing the liquid mixtures or solutions into the articles, by means of pneumatic or hydrostatic pressure, may be obtained in various other modes; the following are examples:—Steam, at very high pressure, may be let into the tank, through a pipe, over the surface of the liquid within, thereby pressing on it with considerable force; or condensed air might be pumped in for the same purpose; or an hydrostatic force may be obtained, in the closed tank, by connecting it with a cistern placed at a considerable height above the level of the tank, by means of a pipe, having a stop-cock in it; when, upon the cock being opened, the pressure of the liquid through the pipe, from the elevated cistern, will be increased in the tank in proportion to the altitude of the cistern over the tank.

Another mode of impregnating wood, is by means of bags, made of sheet caoutchouc, or air and water-proof cloth, large enough to hold about two gallons, which are made open at one end, into which the butt ends of the pieces of wood are placed, and the edges of the bags tied very firm and close to the pieces of wood, by means of small lines, wound several times round the outside edges of the bags, over the pieces of wood; and to the other ends of the bags are fitted small pipes, furnished with stop-cocks, which proceed either to an elevated cistern, containing the liquid with which it is desired to impregnate the wood, as above described, or else to a liquid forcing-pump, as above

mentioned. When the cock in the pipe is opened, the liquid in the cistern, by its greater altitude, will force its way into the pores of the wood; or when the pipe is connected with the pump, the hydrostatic pressure, caused by the pump when worked, will force the liquid into the pores of the wood. One cistern or pump will thus be sufficient to impregnate many pieces of wood at once.

Trees that have just been cut down, may be rapidly impregnated in this manner, and many such new fallen trees will be thoroughly impregnated in a few days, with the solutions of the first class, hereafter mentioned, by merely placing the butt ends in troughs or open tanks, filled with the solutions, which will circulate with the sap throughout the whole tree.

Skins of leather, and fabrics of any kind, may be impregnated in a similar manner, by sewing them together in the form of bags, having pipes leading to an elevated cistern or pump, as above described, through which the solutions or mixtures may be forced into the bags and through every pore of the skins or fabrics.

Pipes, made of leather, or of folds of thick canvass, can, in this manner, be made less pervious to water, with the mixtures or solutions hereafter mentioned, for that purpose, by closing one end of the pipes and forcing the liquid mixtures in at the other end. Any of the articles may also be impregnated by placing them in the tank above described, exhausting the air therefrom by the air-pump, and then applying heat, in any convenient manner, to the tank, until the solution or mixture therein is made to boil, which is commonly called boiling in vacuo.

The mixtures or solutions, to be used with either of the above form of apparatus, for impregnating the various articles, are divided into three classes; the first class containing such as are applicable to render certain of the arti-

cles, above-named, more durable; the second class such as will render all the above-named articles more durable and less pervious to water; and the third class such as will render them less inflammable.

No. 1. *The First Class.*—Solution of sulphate of iron. One pound of the salt to be dissolved in two or three gallons of water, and to be used as soon as dissolved; or the pyroligneous iron liquor, used by dyers, mixed with about half its quantity of water.

No. 2. Sulphate of copper,—one pound of the salt dissolved in three or four gallons of water.

No. 3. The waters of copper mines, and also the waters of streams or brooks in a copper country, which contain copper, suspended in solution in them.

No. 4. Chloride or chlorate of copper,—one pound dissolved in four gallons of water.

No. 5. The yellow chromate of potash,—one pound dissolved in four gallons of water.

No. 6. Refuse lime water from gas works.—This liquor must be allowed to rest for several days, until the lime is precipitated to the bottom, when the supernatant liquor may be drawn off and used to impregnate wood.

The patentee claims the use of chromate of potash and refuse lime liquor, in any manner that may be preferred, for the purpose of rendering wood more durable, as part of this his invention.

No. 7. *The Second Class.*—Any mineral tar, or bitumen, or any vegetable tar, mixed, when necessary so to do, with any volatile oil or spirit, to thin it sufficiently to penetrate the articles on which it is to be used, and to which may be added a portion of caoutchouc or black resin, which is incorporated therewith by heat.

No. 8. Coal tar, obtained from gas works, thinned with from one-third to one-half its quantity of the essential

oil or spirit, obtained by the distillation of coal tar; the common spirit left after the naphtha is obtained, and commonly called in the trade "dead oil," will answer the purpose. Either caoutchouc or resin may be added to this mixture, if required, by dissolving the caoutchouc or resin in the coal tar and oil, by heat, or by adding the well known caoutchouc paste or varnish to the tar and oil,—heating the mixture and stirring it well until the caoutchouc is thoroughly mixed with the tar.

From one quarter to half a pound of caoutchouc, or half a pound of black resin to one gallon of tar and oil, may be used, but it is then necessary that more of the dead oil should be added, to thin it sufficiently to penetrate the wood, &c.

The foreign bitumens or asphaltés may be used instead of the coal tar, but they will require a greater proportion of dead oil or other volatile oil, to thin them sufficiently.

No. 9. Vegetable tar, as Archangel or Stockholm.—These tars contain an acid which is injurious, and therefore, before use, they must be freed from it, by agitating them for some time with lime water, or by throwing into the tubs or vessels, in which the tar stands, a quantity of old rusty iron or iron slag, and this prepared tar is then mixed with the above-named dead oil, or with the spirit distilled from itself; but the dead oil is preferred, as it is cheaper. Caoutchouc or resin may be added thereto, if desired, in the manner described in No. 8.

No. 10. Whale oil, cod fish oil, or any other fish oil, mixed with from one-third to one-half of dead oil.

No. 11. The same as No. 10, with the addition of sulphur,—as three ounces of sulphur dissolved by heat, in every gallon of the above mixture.

No. 12. Boiled or drying linseed oil, mixed with oil or spirits of turpentine.

No. 13. Boiled or drying linseed oil, to which caoutchouc paste is added,—as about one half pound of caoutchouc paste to every gallon of linseed oil.

No. 14. Rape oil, in which caoutchouc is mixed, as in No. 13.

No. 15. Solution of caoutchouc, in spirits of naphtha or turpentine, or any other spirits.

No. 16. Bees' wax, dissolved in spirits of turpentine,—as about one pound of wax, dissolved in one gallon of spirits of turpentine

No. 17. *The Third Class.*—Soluble glass, dissolved in water, in the proportion of one pound to five or six gallons of boiling water. (Soluble glass is well known, and the mode of making it is fully described in several chemical and other books.)

No. 18. Four pounds of alum, eight pounds of potash or soda, two pounds of borax, and four ounces of glue or starch, dissolved in twenty gallons of warm or boiling water. The articles to be dissolved in the water, in the order in which they are named. In describing the solutions and mixtures above-named, the proportions of the ingredients, composing the distinct solutions and mixtures, are given, and also the separate solutions and mixtures found to answer best; but the patentee does not confine himself to these proportions, or to the use of these solutions or mixtures separately, because the ingredients, composing each, may be mixed in different proportions, and several of these solutions or mixtures may be combined with each other, in order to produce the desired effect.

Wood may be impregnated, in the manner above-mentioned, with either of the solutions, No. 1, 2, 3, 4, 5, or 6, of the first class, to render it more durable. When No. 1, is used, and it is intended to place the wood where it will be exposed to the weather, it should be painted or tarred

over. To render wood more durable and less pervious to water, either of the mixtures, No. 7, 8, 9, 10, 11, 12, or 13, of the second class, may be used, according to the different purposes to which the wood is to be applied. The mixtures, No. 7, 8, 9, 10, or 11, are chiefly applicable to wood that is much exposed to the weather, as for rail-road sleepers, piles, out-door posts, and fences. For wood intended to be polished, No. 12, is used, which peculiarly fits it to take a high polish; and No. 13, for wood to be rendered tough, &c.

The mode of impregnating wood, by means of bags, as above described, or new fallen trees, by the circulation of the sap, is not applicable to impregnating wood with either of these last-named solutions of the second class; but in such cases, the wood must be impregnated in the tank, in the manner above mentioned. Cork may be rendered more durable and less pervious to water, by impregnating it with several of the solutions above named; but No. 12, 13, 14, or 15, is preferred. Leather may be impregnated with either of the mixtures, No. 12, 13, 14, 15, or 16, of the second class, respectively, to render it more durable and less pervious to water. In this manner, boots and shoes may be rendered less pervious to water, after they are made.

To render woven and felted fabrics, including paper, more durable, and less pervious to water, they are impregnated with either of the mixtures, No. 12, 13, 14, 15, or 16; and besides these, canvass may be impregnated with either of the solutions, No. 2, 3, or 4, to render it more durable. To render ropes and cordage more durable and less pervious to water, No. 12, 13, 14, or 15, may be used.

All descriptions of pervious stones, such as Portland stone, freestone, chalk, lime, marbles, and plaster of Paris,

or such compositions as are made with burnt clay, or with plaster of Paris and cements, in imitation of plaster or stone, are to be impregnated, in the manner above-named, with the solutions, No. 1, 2, or 3, of the first class, to render them more durable; and with either of the mixtures of the second class, to render them more durable and less pervious to water. In Portland stone, freestone, chalk, or any other pervious stones, No. 8, 9, 10, or 11, may be used.

Marble ornaments, or statues, when impregnated with either of the mixtures, No. 11, 12, 13, 14, 15, or 16, will resist the injury generally caused by exposure to the weather, and become more durable and less pervious to water, which, congealing in its pores by the frost, causes it frequently to crumble away. Statues or ornaments made of plaster of Paris, or with the compositions above mentioned, must be impregnated with either No. 1, 2, or 3, of the first class, or with either No. 10, 11, 12, 13, 14, 15, or 16, of the second class. Bricks, impregnated with either No. 7, 8, or 9, would be very durable, and less pervious to water, and useful for many purposes, particularly for building foundations of houses or cellars, in damp situations, or for paving the streets, the joints being made with asphalte or bituminous matter, instead of common lime mortar. All the articles above named, may be rendered less inflammable by impregnating them in the manner above described, with either of the solutions of the third class, No. 17 or 18.—
[Inrolled in the Rolls Chapel Office, January, 1839.]

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 59, Vol. XX.)

June 15th, 1841.

The PRESIDENT in the Chair.

**"Description of the new Sewer in the Valley of the Cowgate,
Edinburgh."—By George Smith.**

In this communication the author first gives an account of a complete system of drainage, designed by him as architect to the Commissioners for improving the City of Edinburgh, and then describes the mode of constructing the first sewer, which begins at the south back of the Canongate, passes along the Cowgate, and through the Grass-market to the foot of the Bow.

This principal sewer is 950 feet long; it was built in several sections; the upper portion was 4 feet high by 2 feet 6 inches wide, and increased at the lower extremity to 5 feet high by 3 feet wide; it was constructed of stone, with vertical sides, and large flat stones for both the sills and the covers—the dimensions of the branch drains varied in proportion to the quantity of matter passing through them; they were situated opposite the cross streets, and had a cesspool to each, with a malleable iron grating, hinged, to afford access for cleansing them.

The average depth of the excavations was 9 feet; a great portion of the work demanded great precaution in executing, on account of the narrowness of the streets, the frequent floods, the local impediments from the gas pipes, &c., and the soft character of the ground, as in some places the foundation stones sunk deep into the mossy soil by their own weight; it has, however, proved very successful, and will doubtless induce an extension of the sewage of the City of Edinburgh, which has been too long neglected.

The paper was accompanied by two drawings of the construction of the sewers, and the plan of the general system proposed, with the report to the Commissioners and other explanatory documents.

"On an uniform system of Screw Threads."

By Joseph Whitworth, Assoc. Inst. C. E.

The subject considered in this paper, is the importance of having a constant thread for a given diameter in all screws used in fitting up steam engines and other machinery. It is argued, that uniformity of thread would be productive of economy, both in the use of screwing apparatus, and in the consumption of bolts and nuts. The refitting shop of a railway or steam packet company, affords a striking instance of the advantage to be derived from the application of this principle. If the same system of screw threads were common to the different engines, a single set of screwing tackle would suffice for any repairs.

No attempt appears to have been hitherto made to attain this important object. Engineers have adopted their threads without reference to a common standard. Any such standard must be in a great measure arbitrary, and hence its absence may be accounted for.

The author enters at some length into the consideration of the circumstances affecting the choice of a thread, with a view to show that it cannot be determined by precise rules. The essential characters of the screw thread are—pitch, depth, and form. The required conditions are—power, strength, and durability. But the exact degree or proportion in which these conditions are required, cannot be ascertained, and consequently the characters on which they depend, cannot be fixed by calculation. An approximation may be made, but within a certain limit the decision is arbitrary.

The mutual dependance of the several conditions, and the relation subsisting between the constituent characters, are noticed as having a tendency to perplex in the choice of a thread.

From the vagueness of the principles involved in the subject, a corresponding latitude was naturally to be expected in the practical application of them, and accordingly, instead of that uniformity which is so desirable, there prevails a diversity so great as almost to discourage any hope of its removal. The only mode in which this could be effected, would be by a compromise; all parties consenting to adopt a medium for the sake of common advantage. The average pitch and depth of the various threads used by the leading engineers, would thus become the common standard, which would not only have the advantage of conciliating general concurrence, but would in all probability approach very nearly to the true standard for practical purposes.

The author then proceeds to describe the mode adopted by Messrs. Whitworth and Co., some years since, in selecting their threads upon this principle. An extensive collection was made of screw-bolts from the principal workshops throughout England, and the average thread was carefully observed for different diameters. The $\frac{1}{4}$ inch, $\frac{1}{2}$ inch, and $1\frac{1}{2}$ inch, were particularly selected, and taken as the fixed points of a scale by which the intermediate sizes were regulated, avoiding small fractional parts in the number of threads to the inch. The scale was afterwards extended to 6 inches. The pitches thus obtained for angular threads were the following:—

Diameter in inches.	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1"	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	$1\frac{7}{8}$	2"
No. of threads to the inch.	20	18	16	14	12	11	10	9	8	7	7	6	6	5	5	$4\frac{1}{2}$
Diameter in inches.	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3"	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{3}{4}$	4"	$4\frac{1}{4}$	$4\frac{1}{2}$	$4\frac{3}{4}$	5"	$5\frac{1}{4}$	$5\frac{1}{2}$	$5\frac{3}{4}$	6"
No. of threads to the inch.	4	4	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	3	3	$2\frac{7}{8}$	$2\frac{7}{8}$	$2\frac{3}{4}$	$2\frac{3}{4}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$

Above the diameter of 1 inch, the same pitch is used for two sizes, to avoid small fractional parts. The proportion between the pitch and the diameter varies throughout the entire scale.

Thus the pitch of the $\frac{1}{4}$ inch screw is $\frac{1}{20}$ th of the diameter; that

of the $\frac{1}{2}$ inch $\frac{1}{8}$ th, of the 1 inch $\frac{1}{8}$ th, of the 4 inches $\frac{1}{16}$ th, and of the 6 inches $\frac{1}{16}$ th.

The depth of the thread in the various specimens is then alluded to. In this respect the variation was greater than in the pitch. The angle made by the sides of the thread being taken as an expression for the depth, the mean of the angle in 1 inch screws was found to be about 55° , which was also nearly the mean in screws of different diameters. Hence it was adopted throughout the scale, and a constant proportion was thus established between the depth and the pitch of the thread. In calculating the former a deduction must be made for the quantity rounded off, amounting to $\frac{1}{3}$ rd of the whole depth, i. e. $\frac{1}{4}$ th from the top, and $\frac{1}{4}$ th from the bottom of the thread. Making this deduction, the angle of 55° gives for the actual depth rather more than $\frac{2}{3}$ ths, and less than $\frac{3}{4}$ ths of the pitch.

It is observed, that the system of threads thus selected, has already been widely extended, demonstrating the practicability and advantage of the proposed plan. The author then notices the obstacles to general uniformity arising from the inconvenience which any change would occasion, in existing establishments, and also from the imperfect screwing tackle in general use. He anticipates as an important result of a combined effort to introduce uniformity, that screwing tackle generally would be much improved, and the efficiency and economy of bolts and nuts be thereby increased.

He recommends also standard gauges of the diameters and threads, as they would form a convenient adjunct to the screwing apparatus, and would be applicable to other useful purposes.

“ Account of the original construction and present state of the Plymouth Breakwater.”

By William Stuart, M. Inst. C. E.

In the year 1806, the Lords Commissioners of the Admiralty instructed the late Mr. John Rennie, C. E., and Mr. Whidbey,

then Master-Attendant at Woolwich Dockyard, to make a survey of Plymouth Sound, with a view to the construction of a break-water for sheltering vessels.

Their report was favourably received, but it was not until 1812 that the works were commenced.

Their plan consisted of a pier or breakwater, 1700 yards in length, the centre part of which, 1000 yards long, was straight, with an extension, at each end, 350 yards in length, placed at an angle of 20° with the main body. The top to be 30 feet wide, at the level of 10 feet above the low water of an ordinary spring-tide;—the slope, towards the sea, to be 3 feet horizontal to 1 foot perpendicular, and on the land-side 1 foot 6 inches horizontal to 1 foot perpendicular.

By the middle of March, 1813, the work had been brought up in parts to within 5 feet of low-water mark of spring-tides—at this period 43,789 tons of stone had been deposited—and in the month of March, of the following year, sufficient shelter was afforded for ships of war to anchor in the Sound, instead of in Cawsand Bay.

It was then determined to raise the whole structure to the height of 20 feet above low-water spring-tides: great exertions were made to complete it rapidly; and during the week ending on the 24th of May, 1816, the quantity of stone deposited, amounted to 15,329 tons, which was the largest quantity ever conveyed within the same space of time.

Slight injury had frequently been received by the works whilst in progress, but the storm of the night of the 19th of January, 1817, was the first which materially affected them. The most destructive effects were, however, produced by the storm of the 22d and 23d of November, 1824. On that occasion, the spring-tide rose 7 feet higher than usual; and so great was its power, that a length of 796 yards of finished work was completely overturned, and the remaining parts slightly injured.

It was observed, that the effects of this storm left the slope from low-water mark upward, at about 5 feet horizontal to 1 foot vertical. It was, therefore, determined to adopt that angle of

inclination for the exterior or sea-side, and a slope of 2 to 1 for the inside. The centre line of the breakwater was also removed 39 feet 6 inches towards the north, and the top width was increased to 45 feet.

The works continued upon this scale until 1830, when a fore-shore was added, of a width of 50 feet at the toe of the south slope at the west end, and of 30 feet at the east end of the main arm: for this purpose 600,000 tons of stone were deposited.

The extreme western end of the breakwater was then, after more alterations and extensions, terminated by a circular head, with an inverted arch, as a foundation for a light-house, now constructing, under the direction of Messrs. Walker and Burges.

In consequence of further injuries from storms in 1838, when large quantities of stones, of 15 or 20 tons weight each, were torn from below low water, and carried completely over the top of the breakwater, a further extension of the fore-shore was made, and a projecting buttress built to secure the foot of the south slope, to afford additional security to the light-house, and to prevent the stones from the fore-shore being carried over to the north side.

From the time of its commencement in August, 1812, until the 31st of March, 1841, there had been deposited upon this work 3,369,261 tons of stone.

The expenditure upon the whole work, when completed, will, it is estimated, be within one million and a half sterling.

The main body of the work is composed of blocks of limestone, from the quarries of Oreston, adjoining the harbour of Catwater. They were deposited from vessels, constructed for the purpose. In certain portions of the work, the blocks have been subsequently ranged from a diving bell. The buttress and the works, now in progress round the west end, are composed of granite masonry, dove-tailed horizontally, and fixed vertically by iron levis cramps.

Subsequently to the reception of the plan of Messrs. Rennie and Whidbey, most of the leading engineers of the day were consulted, under whose directions the author has superintended the execution of the work.

The communication is accompanied by six elaborate drawings, by Mr. Dobson, under the superintendence of Mr. Stuart, illustrating, in detail, the various stages of the work, and the mode of construction.

June 22, 1841.

The **PRESIDENT** in the Chair.

“On the Construction and Use of Geological Models, in connection with Civil Engineering.”

By Thomas Sopwith, F. G. S., M. Inst. C. E.

The author commences this paper with a review of the various methods adopted for the representation of objects required in carrying out the designs of engineers, architects, and mechanics—whether as the means whereby such designs are first studied, and afterwards matured—as guides for the resident superintendents and workmen—or for being preserved as records of what has been executed, and studies for those who may be engaged in similar undertakings.

He then proceeds to elucidate the advantages peculiarly possessed by models for demonstrating practical results in Geology and Mining, dividing the subjects into six heads, as follows:—

1. On the application of modelling to geological and mining purposes.
2. On the materials to be employed.
3. On the mode of construction.
4. On the scales to be employed.
5. On the objects to be represented.
6. On the use of geological models, and the connection of the subject with civil engineering.

1. A large number of plans and sections is usually required to elucidate with clearness the geology of a district, and the nature and extent of mining operations; and few departments of practical science admit of greater improvement than the art of delineating mining plans, in connection with geological features.

Much ingenuity has been exercised in representing the undulating surface of countries, either by the process called "relief-engraving," (*procédé Collas*,) or as in the Ordnance Maps of England and Wales, and Mr. Greenough's recent edition of his Geological Map; but even in comparison with these, a model affords a more correct idea. Hence models in relief are more peculiarly applicable in all cases where it is *désirable* to comprehend at once the relations of the several parts, and it is evidently still better adapted to explain the geological conditions; especially when it is required to shew the relative position of various rocks, their inclination, thickness, extent, and the disturbances to which they have been subjected, which could only be understood by comparing together a number of drawings.

To those interested in mining, therefore, the easiest mode of conveying ideas, is by modelling. This was illustrated by two models of the Forest of Dean, and by reference to Mr. Jordan's model of the Dolcoath Mine, now in the Museum of Economic Geology.

2. The first material for forming a model, which naturally occurs to the mind, is clay,—pins and wires being used to define the principal elevations. Plaster of Paris has occasionally been used, and is well adapted for solid forms, where the edges are not exposed to injury; but its brittleness and contraction in drying, are objectionable. *Papier Maché* is a more elegant and durable material, but the expense of the requisite moulds prevents its general use. Coloured wax is adapted for small models not subject to be handled. Pottery appears to possess more requisites, but many corresponding disadvantages. Of all the materials which the author has employed, he found none so generally useful as well-seasoned wood, whether for the facility with which the requisite forms are attained, for durability, for portraying different strata by various-coloured woods, or for comparative economy.

3. The mode of constructing geological models had been briefly alluded to by the author on a preceding occasion. It is more fully described in the present communication, and was illustrated

by complete models, and the detached parts for forming them purposely made on a large scale.

The plan of the district being divided by lines, at given distances apart, into a certain number of squares, a series of thin slips of wood are made to intersect each other, corresponding to the lines so drawn ;—upon these slips the profile of the surface, and the positions of the strata, are delineated, when it is intended that the model, when complete, shall be dissected ; the compartments are then filled in with wood, and carved down to the lines upon the slips ; the several strata thus rest upon the subordinate beds, and can be detached in a mass or in compartments ; these being geologically coloured, convey an accurate idea of the relative positions of the strata, and display, with the utmost clearness, the mining operations in each. This system is applicable to any extent ; and the operation of forming the model is so simple, that a skilful workman at once comprehends and executes unerringly the instructions given him by the engineer or surveyor, as the accuracy entirely depends upon the profile which is drawn upon the slips. The author considers lime-tree or plane to be the most suitable wood for the purpose ; but in the construction of small models for showing peculiar geological features or disturbances of strata, he uses various coloured woods : as an illustration of which he shewed a series of twelve models, which (with a printed description) are now in the Museum of the Institution. These contain 579 pieces of wood, one of them consisting of 130 pieces. By fitting the parallel layers of wood together, and arranging them in conformity with sections of strata of the carboniferous limestones and coal measures of the North of England, he illustrates the formation of that district, and the nature of its dislocations, &c., better than can be done by any number of plans and sections.

4. Attention is drawn at some length to the proportion to be observed between the horizontal and vertical scales, and the relative merits of corresponding and dissimilar horizontal and vertical scales fully examined, illustrating the positions by two models of the Forest of Dean, in one of which the vertical is en-

larged to three times that of the horizontal scale ; while the other has the scales exactly alike. For the conventional purpose of giving an idea of a country such as would be formed by a general observer passing through it, the former model appeared best adapted ; but in a scientific point of view, the latter had a decided advantage, being based on geometrical truth, and conveying an exact knowledge of the real, but not of the apparent relations of the surfaces, and other objects represented.

5. Models had hitherto been chiefly used for conveying impressions of tracts of the surfaces of countries, or for displaying the minute tracery and proportions of buildings. The author's views have been more especially directed to introducing the construction of models for geological and mining purposes, for which he considers them peculiarly adapted.

The series of models now presented to the Institution, contains examples of various geological phenomena of regular stratification—interruption by slips, faults, and dykes—the effects of denudations in exposing to view the various strata—the deceptive appearance of the course of mineral veins on the surface—the intersection of veins—and many other details which are intimately connected with practical mining.

6. The author then proceeds to describe his view of the uses of such models, and the connexion of the subject with civil engineering.

He considers that by them a practical knowledge of geology may be attained by the civil engineer, and that such knowledge is indispensable for his guidance in many of the works he is called upon to undertake in the exercise of his profession. It is to an engineer that the merit justly due of having, by efficiently labouring to establish English geology on a firm basis, acquired the title of " Father of Geology," which has been generally conceded to the late William Smith.

The avocations of the civil engineer peculiarly qualify him for an observant geologist ; and being called upon to visit so many different districts, the remarks he might make would be replete with instruction. These observations might be illustrated more

efficiently by models than by any other means ; at the same time they might be made to answer another purpose—that of demonstrating to the owners of mineral property, the advantage or the futility of commencing researches or mining speculations.

Plans do not admit of such certainty of definition as modelling, and no regular system of planning mining districts has yet been generally practised, by which the engineer can judge of the probable results of the operations which he is often called upon to direct. As a record of mining operations, models of this kind are pre-eminently valuable ; the exact position not only of the mineral veins and the strata are clearly shown, but the quantities extracted are registered, and a guide for future proceedings is established. The author contends that it is a duty to secure, while it is in our power, such records of mining operations as may enable us and our successors really to exhaust whatever minerals can be worked with advantage.

“ Description of the Bann Reservoirs, County Down, Ireland.”

By John Frederick Bateman, M. Inst. C. E.

The construction of the reservoirs described in this communication, was undertaken with the view of regulating the quantity of water in the River Bann, and more effectually supplying water power to the flourishing and increasing establishments on its banks ; this river is, from the bare and naked character of the Mourne Mountains, among which it rises, naturally liable to the greatest irregularity in its volume ; devastating floods frequently pour down the channel, where a few hours previously there was not sufficient water for agricultural purposes : greatly injurious as this must have been to the agriculturist, it was infinitely more so to the mill owners, who depended entirely upon water power for their manufactories.

Mr. Fairbairn was consulted on the subject ; he examined the locality, and advised the formation of reservoirs : the author was appointed the engineer, and acting in some degree upon the

suggestions of his predecessor, whom he continued to consult, the works were undertaken which are described in the present paper.

The peculiarities in the act of parliament, granted in 1836, constituting the proprietors of the mills a Joint Stock Company, for the formation of the Bann reservoirs, are detailed.

The works were originally intended to have been more extensive than have been really executed. The reservoir at Lough Island Reavy, is alone described; the ground in that spot was admirably adapted for the work, being the bottom of a basin, which was bounded on all sides by rugged hills of granite; in the centre of the basin was a small lake, at the bottom of which was discovered a bed several feet in thickness, of fossil *confervæ*, similar to those discovered by Professor Silliman at Massachusetts, North America. This interesting geological fact was first noticed by Dr. Hunter of Bryansford; the *confervæ* appeared like an impalpable powder, but when viewed through a powerful microscope, they were found to be regular parallelograms, many of them covered with *striæ*. They are described by naturalists as the fossil skeletons of minute vegetables.

The situation fixed upon for the reservoir, rendered necessary the construction of four embankments between the hills, so as to raise the water to a height of 35 feet above the summer level of the lake.

These embankments were all constructed in a similar manner, only varying in the slopes and thickness of the stone facing, according to the extent and situation.

The whole substratum of the valley was water-tight, either from the existence of the solid rock, dense clay, or of hard, compact, mountain gravel; so that there was no difficulty in securing the foot of the puddle. A trench was sunk into the water-tight stratum, whence the vertical puddle wall was carried up with the bank to the required height. It was 12 feet in width at 40 feet below the top, diminishing gradually to 8 feet wide at the summit, and was worked in regular layers of 8 inches in thickness.

The embankments were formed in concave layers 3 feet thick, each layer being completed before another was commenced ; steps being cut in the ground where necessary, to receive the layers.

In order further to secure the tightness of the bank, a lining of peat, 15 inches in thickness, was brought up on the inside of the puddle, and a layer of the same material was laid upon the face of the slope ; it was cut small, placed in thin courses, like the puddle, and merely trodden down, without more moisture than it naturally contained. The author advocates the use of peat in such positions, as, from its light and fibrous nature, in case of a leak occurring, the draught would attract into it all the fibrous particles, which by degrees would stop the holes sufficiently for the silt to settle over and effectually close the aperture.

Above the peat a course of gravel, 3 feet in thickness, was laid, and upon that the stone pitching, forming the inner side of the bank.

The inner slopes were for 20 feet below the top of the bank, $2\frac{1}{2}$ horizontal to 1 vertical ; the outer were 2 horizontal to 1 vertical ; where they were deeper than 20 feet, the remainder of the backs sloped 3 to 1 on the inside, and $2\frac{1}{2}$ to 1 on the outside.

All the embankments are 12 feet wide at the top, and 5 feet above the water level.

The centre of the deepest part of the embankment was traversed by a stone culvert, in which were placed two rows of cast-iron discharge pipes, 18 inches diameter, with suitable valves. A leak was discovered in the centre of the masonry of this culvert, occasioned by the engineer's instructions not being obeyed. The details of the methods employed for remedying this defect are given at length ; as also those of the experiments upon cements, made by the author after the data given by Vicat. The materials which were most accessible for the work, were tested very carefully, and from the results, it was determined to employ mortar composed of rich Manx or mountain lime, carefully slaked, and clay burned with peat in the open air. The proportions were $2\frac{1}{2}$ of clay to 1 of lime. They were ground together, and being mixed with as much water as was necessary, the mortar

was used immediately. The mortar for the baking, had one measure of sand added; the grout had two measures of sand in it, and was used thin.

The concrete was composed of one part of lime, two and a half of calcined clay, and about three parts of sharp gravel.

This cement appeared to set hard, and to be perfectly tight; but when the reservoir was partially filled, several leaks were discovered, which rendered an examination necessary, and some energetic measures were taken to stop them, all which are described.

The result of the author's experience seems to be, that mortar made from rich lime and calcined clay, as recommended by Vicat, may set and harden under water, when there is little pressure, but that it is not able to resist the pressure of a considerable depth of water.

The details of the construction of the masonry of the valve-house, the fore bay, the waste weir, the bridge of three arches, constructed over the feeder from the river Muddock, and the various feeders for supplying the reservoir, are given at length, with the particulars of the expenditure of the sum of £14,891. which was the cost of the work, exclusive of land compensation, or salaries and professional charges.

The particulars are also given of a series of observations with rain gauges, continued for two years, for the purpose of furnishing data for computing the extent of reservoir which would be necessary to insure a supply of water throughout the year.

The communication is accompanied by detailed drawings of every part of the works, and a plan of the district in which they are situated.

"Description of a machine for sewing Flat Ropes."

By Eugenius Birch, Grad. Inst. C. E.

In a previous communication, Mr. Birch described and gave drawings of the ingenious machinery invented by Captain Hud-

dart: the subject was not entirely complete without the description of the present machine, which, although not of great importance in a scientific point of view, is well worthy of notice, in consequence of its being attached to this valuable rope machinery, and of its having been worked so successfully.

It is used for sewing or lacing together ropes, and forming them into flat bands, which are used for mining purposes, &c.

The bands or flats generally consist of four ropes, which are placed parallel to each other, and paired in contrary directions to the angle of the lay; being held under an equal degree of tension, they are sewn together with two cords or lines, by needles which are driven through holes previously pierced in the ropes, at an angle of 45 degrees, and the cords are then drawn tightly in a lateral direction.

That the ropes may be pierced more easily, it is necessary that the tar which they retain from the process of warm registering, should be softened: this is accomplished by passing them through a steam chest, whence they are drawn into a frame composed of four plates, which are placed so as to compress the ropes while they are in the softened state, and form a die which can be regulated to the size of the ropes required to be sewn. The piercing operation is performed in the die, which has slots in its sides for passing the piercers through.

There are not any recorded experiments on the strength of the ropes, but it is considered, that the amount of strength possessed by the flat rope, is not equal to the sum of that of the four ropes before they were united; still the advantages of this mode of assemblage are so great, as to insure its preference in mining operations, and many other applications.

The drawings (which are numbered onward from the commencement of the set presented to the Institution, in the session of 1838,) display the entire machine, with details of all the parts.

ON ARTIFICIAL FUEL.

Coal, in its natural state, may be considered to consist principally of bitumen and carbon, with some earthy matters. Without entering into the philosophy of combustion, it will be sufficient to say, that all artificial fuel must contain substances possessing bituminous and carbonaceous properties. Consequently we find, that the compounds for making artificial coal, for which patents have been obtained, to a certain extent are alike, or possess the same elements; and only differ in the employment of sundry kinds of substances, all containing carbon and bituminous matters, capable of generating inflammable gas and sustaining combustion, the proportionate quantities of each, and the means by which they are intermixed, constituting their several peculiarities.

The first attempt at the production of an artificial coal, appears to have been merely for the purpose of appropriating to use, the slack and refuse coal dust, sifted from the ordinary coal of commerce; which, on being mixed and coagulated with some other material or substance, of little or no value, produced a cheap and useful fuel, of inferior quality.

A superior sort of artificial coal was subsequently made, by combining various bituminous and carbonaceous materials, which, possessing but a small proportion of earthy matters, was found capable of affording an intense heat, and therefore applicable not only to the purposes of domestic use, but to the generating of steam, and heating and boiling in various departments of manufacture.

Latterly, the economisation of room in the stowage of fuel on board steam vessels, became an important desideratum; and to effect this object, combinations of the most inflammable materials have been made, and these being compressed into regular shapes, affording the means of close package, and producing a greater intensity of heat than natural coal, have created a demand for the most perfect artificial coal that could be produced; to the accomplishment of which, the public attention has recently been most anxiously directed.

These compounds of combustible materials, for producing an artificial coal, have been made the subjects of many patents; the earliest which has come under our notice, is a grant to Mr. Peter Davy, dated 20th May, 1800. The object of the patentee was to produce an economical artificial coal, which should not emit smoke or the smell of sulphur. For this purpose it was proposed, that a quantity of the dust of sea coal should be mixed with charcoal, breeze, turf, tanners' bark, saw-dust, peat, or other combustible material, in such proportions as the qualities required

might demand; that is,—if the fuel were designed for a furnace, in which there was a powerful draught, a greater proportion of the lighter matters should be introduced.

The materials, when well mixed, either in a dry state or with moisture, were to be placed in an oven or kiln, for such a space of time, and under such a degree of temperature, as would cause the material to be partially coked and cemented into a concrete mass,—care being taken, that the temperature was not such as to destroy the materials.

In November, 1818, Mr. Ingledew, took a patent for economising fuel in furnaces, by placing upon a shelf, above the fire, a quantity of chalk or lime, which, becoming heated from the combustion of the coal below, concentrated the heat, and retained it under the boilers or retorts. These materials were not, however, combined or brought into immediate contact.

Messrs. Christie and Harpur obtained a patent, 9th of October, 1823, for an improved method of combining and using fuel in furnaces, &c. This improvement was mixing small bituminous coal with culm or stone-coal, which, after being completely blended together, was placed in an oven and converted into coke.

The same parties had a subsequent patent, 12th of February, 1824, for an improved method of combining and applying certain kinds of fuel, which appeared to consist only in determining the proportionate quantities of the materials, viz., from one-fifth to one-third of bituminous coal, the remainder being stone-coal, culm, or anthracite. These proportions were to be regulated in quantity according to the qualities of the materials and the draught of the furnace or fire-place.

In 1825, April 20th, a patent was granted to T. Sunderland, Esq., for his new combination of fuel, which was a mixture of gas-tar and clay, with saw-dust or refuse tanners' bark, or dye-wood, or other wood, (granulated,) or peat. The proportions were one-quarter gas-tar, one-quarter clay, and one-half of any of the other ingredients, or one-third of each would do very well, These materials being intimately mixed, and formed into cakes, were to be dried by the air or by artificial heat, and would then be fit for use.

A combination of refuse materials, or those of little value, was the subject of a patent to Mr. Levy Zachariah, 8th of May, 1826.—Dry horse-dung, with saw-dust, spent bark or dye-wood, coke, cinder ashes, or any other carbonaceous material, or clay, mud, and many other substances, reduced to powder, were to be mixed with water, and when properly combined, to be dried, and then cut into cakes. These cakes were afterwards steeped in coal-tar, or oil, or grease of any kind, in a boiling state, and having absorbed these fluids, they became fit for use.

Mr. Stafford, 2nd of November, 1833, under a patent for improvements in fuel, combined sea-coal with clay, sand, and alluvial deposits, in the proportion of one-half sea-coal with any of the other materials. These, when reduced to powder, were to be intimately mixed with tar and water, until they acquired such a consistency as would allow of their being made up into cakes, and after being dried in the sun, were fit for use.

Under a patent of 4th October, 1836, Mr. Mohun made an artificial fuel, by mixing peat moss, or turf, with slimy mud, marl, or earth, composed largely of vegetable matter, which was to be combined with nitre, alum, linseed, or unctuous vegetables, as nuts. Resin, coke, green vegetable matters, and animal excrement, were also to form part of the mass. The proportions of these materials are set out in the specification, and the manner of mixing them, which was to be done in an ordinary pug mill, such as employed by brick-makers. After being thus mixed, the mass was to be pressed into moulds, in order to render it compact for convenience of stowage and durability, when in a state of combustion.

February 6th, 1837, a patent was granted to Mr. Linning, for converting peat-moss, turf, and bog, into fuel. The manner of operating was, first, to grind the peat in a pug-mill, or under rollers, by which it became a jelly, and after being spread out on a level floor, it was cut into cakes, or moulded like bricks. Under some circumstances, coke, made from peat moss, was ground and mixed with the jelly, and after the mass had been pressed, and dried by natural or artificial means, it would be fit for use.

The first patent of C. W. Williams, Esq., for manufacturing fuel, dated 11th of November, 1837, consists in a peculiar method of treating peat-moss or bog-earth, in order to extract the water; and, in doing this, the material was mixed with powdered limestone, coal, or sand, to assist in breaking up the fibres and discharging the water, which was greatly assisted by the absorption and filtration through porous vessels, whilst the material was under great pressure, which enabled it to be compressed into hard blocks or cakes, ready to be dried for use.

In Mr. Joyce's patent of 16th December, 1837, a preparation of charcoal was proposed, which should not emit the carbonic acid gas, when under combustion. The charcoal, having been wetted with a solution of alkali, was submitted to a red heat, or the alkali might be applied to the fuel after burning, before it had cooled.

After this, the next in succession, is Mr. Oram's patent of March, 1838, for combining powder or dust of bituminous coal with mud, clay, or other earthy and vegetable matters mixed.

with water, which will make an excellent coal. It is also mentioned, that other things may be incorporated with these, as bituminous and carbonaceous substances.

When the materials had been intimately mixed together, the mass was to be moulded into conveniently sized blocks or cakes, and these pressed, for the purpose of bringing the particles closely together, and condensing the material into as compact a state as possible, for the convenience of close stowage. For this, any suitable apparatus or implements might be used.

The first claim is, combining the dust of bituminous coal with earths containing vegetable matters, and mixing these with water.—This, however, is especially confined to the condition, that the quantity of coal shall be equal to, or greater than that of the earthy materials. The second claim is, moulding and pressing this compound into cakes.

On the 26th of April, 1838, Mr. Goodwin obtained a patent for manufacturing fuel, which is described as consisting in mixing materials, which, in themselves, are nearly useless.—Fullers' earth, clay, loam, or mud, with tar, bituminous coal, (pounded,) and road dirt.—These, with water, were to be mixed and ground in a mill, and then moulded into cakes, compressed and dried for use. The road dirt being the novelty claimed.

In the patent of Mr. Geary, 26th of May, 1838, pitch, made from coal tar or caoutchouc, was to be mixed with clay or sand, cinders, saw-dust, spent bark, and coal, reduced to powder; among which, was also introduced sulphuric acid, the last being the new matter, incorporated with the other materials which is claimed.

C. W. Williams, Esq., had a second patent for fuel, dated 26th July, 1838. This was a mode of making coke from peat moss, and mixing it with bituminous matter, for the production of an artificial coal. The peat was dried, and then pressed and converted into coke in an oven or stove, or by a current of hot air; and, after being pulverised, was mixed with resin, pitch, tar, or other bituminous materials, and made into cakes for fuel.

C. W. Williams, Esq., had a third patent, dated 14th August, 1838, for a mode of purifying bituminous matters, for the purpose of enabling them to give out a greater intensity of heat when employed for fuel. The object was particularly, to remove the ammoniacal gas, which was to be effected by agitating the materials, and mechanically mixing them with atmospheric air.

Mr. Mohun, under his second patent, dated 8th of November, 1838, among other things, claimed to have invented a composition fuel, consisting of peat or peat moss, clay, and alluvial deposit or mud, which were to be mixed with coke, and the ex-

crement of animals and green vegetables. — To this, pitch, asphalte, bitumen, resin, and naphtha, were to be added, and also bark and unctuous vegetable matter, as nutshells. — These, having been pulverised, were mixed up in a pug mill, and afterwards moulded into cakes in a machine, such as might be used for making bricks.

In the patent of Mr. Cruikshanks, 3rd of July, 1839, there is a proposition to conduct the tar, evolved from a gas retort, into the furnace, and allow it there to be mixed with an inferior quality of coal dust or anthracite, possessing little or no bituminous matter. — This, though a substitute for coal, can hardly be called an artificial coal.

Mr. Stirling, in his patent of 20th March, 1840, for the manufacture of fuel, mixes pulverised coal with tar and clay. The tar is boiled, and in that state, the clay, in solution with water, is first poured into it, and afterwards the pulverised coal; which materials, when intimately mixed together, are, in their hot state, introduced into moulds to be cast into blocks of the form and dimensions of bricks. The moulds are then placed in an oven, to remain until the aqueous matters are driven off, and when cold, the fuel is fit for use.

Mr. Grant's manufactured fuel, under patent, dated 13th July, 1840, is a compound of coal dust and tar, or other bituminous materials, converted, by heat, into the consistency of pitch, and this is cast into blocks in the forms of bricks.

Doctor Albert, 1st February, 1841, — under his patent for the manufacture of fuel, combines the following articles: — Bituminous schiste, ground fine; aluminous clay, in a dry state; mineral oil; and pulverised coal, with vegetable and mineral gelatine or tar. The gelatine materials are heated to a liquid state, and then the other matters are introduced, and intimately mixed up into a mass, which is to be run out upon the ground, and allowed to cool into a slab or broad cake, instead of being moulded and pressed into blocks.

The last patent for artificial fuel, specified in England, up to the present time, February, 1842, is in the name of Newton, as agent for the inventor, Major André Weschniakoff, of Russia. The materials compounded, are coal, charcoal, coke, or peat, reduced to powder, which are mixed with animal or vegetable oils. With these materials, clay or loam, in solution with water, is to be incorporated, and then the mass formed into cakes by hand, or by any suitable machinery; which, after being dried, are fit for use. The inventor has denominated this compound 'carboleine.'

It will be seen by the above report, that there are but slight shades of difference between the compositions and modes of

making the several artificial coals, for which patents have been taken in England. How far these differences may be important and essential to the production of a superior article, so as to be considered a genuine invention, and constituting a valid patent, must be determined by proof of the fact; that is,—by shewing that these differences cause new and valuable results, and that any one of the compounds is vastly superior in economy and usefulness to any of the others which have preceded. To speak decidedly on these points from theory, in this case, is impossible, as considerable time and careful experiments, with a sufficient practical use of each compound fuel, can alone solve the question.

These patents may all be considered as valid, until by the verdict of a court of law, any one of them shall be found to be an evasive imitation of a previous invention. It would, therefore, be improper, indeed unjust, (in a public journal,) to give a decided opinion upon the merits or validity of any one of these patents, in the absence of arguments that might be urged on their several cases. The duty of a court of law, and a legally convened jury, being to determine such questions, this should not be pre-judged by the fallible opinion of an individual.

Original Communication.

REPORT ON THE APPARATUS ERECTED IN THE REFORM CLUB HOUSE,

For Warming and Ventilating its several Apartments.

BY ANDREW URE, M. D., F. R. S., PROFESSOR OF CHEMISTRY, &c.

There are two general plans in use for at once diffusing heat, and renewing the air in extensive buildings, which plans differ essentially in their principles, modes of action, and effects. The oldest, and what may be called, the *vulgar* method, consists in planting stoves in the passages or rooms, to give warmth in cold weather, and in constructing large and lofty chimney-stalks, to draw air in hot weather out of the house, by suction, so to speak, whereby fresh air flows in, to maintain, though imperfectly, an equilibrium of pressure. In apartments, thus warmed and ventilated, the atmosphere is necessarily rarer than it is out of doors,

while, in cold weather, the external air rushes in at every opening and crevice of door, window, or chimney—the fruitful source of indisposition to the inmates.

The evils resulting from the stove-heating and air-rarefying system were, a few years ago, investigated by me, in a Paper read before the Royal Society,* and afterwards published in several scientific and technological journals. It is there said, that the observations of Saussure, and other scientific travellers in mountainous regions, demonstrate how difficult and painful it is to make muscular or mental exertions in rarefied air. Even the slight rarefaction of the atmosphere, corresponding to a low state of the barometer at the level of the sea, is sufficient to occasion languor, lassitude, and uneasiness in persons of delicate nerves; while the opposite condition of increased pressure, as indicated by a high state of the barometer, has a bracing effect upon both body and mind. Thus, we see how ventilation, by the powerful draught of a high chimney-stalk, as it operates by pumping out, exhausting, and attenuating the air, may prove detrimental to vivacity and health; and how ventilation, by forcing air in with a fan or a pump, is greatly to be preferred, not only for the reason above assigned, but because it prevents all regurgitation of foul air down the chimneys, an accident sure to happen in the former method. Genial air thrown in by a fan, in the basement story of a building, also prevents the stagnation of vapours from damp and miasmata, which lurk about the foundations of buildings and in sewers, and which are sucked in by the rarefying plan. Many a lordly mansion is rendered hardly tenantable from such a cause, during certain vicissitudes of wind and weather.

The condensing plan, as executed by the Engineers, Messrs. EASTON AND AMOS, at the Reform Club House, consists of a large fan, revolving rapidly in a cylindrical case, and is capable of throwing eleven thousand cubic feet of air per minute into a spacious subterranean tunnel, under the basement story. The fan is driven by an elegant steam-engine, working on the expansion principle, of five horses' power. It is placed in a vault, under the flag-pavement, in front of the building; and as it moves very smoothly, and burns merely cinders from the house fires, along with some anthracite, it occasions no nuisance of any kind. The steam of condensation of the engine supplies three cast-iron chests with the requisite heat for warming the whole of the building. Each of these chests is a cube of three feet externally, and is distributed internally into seven parallel cast-

* I had been professionally employed by a Committee of the Officers of the Custom House, to examine the nature of the malaria which prevailed there, but I had no concern in erecting the stoves which caused it.

iron cases, each about three inches wide, which are separated by parallel alternate spaces, of the same width, for the passage of the air transversely, as it is impelled by the fan.

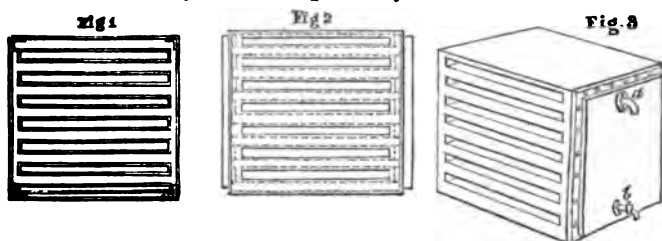


Fig. 1, is a transverse vertical section of the steam-chest, for heating the air; fig. 2, is a plan of the same; and fig. 3, is a perspective view, shewing the outside casing, also the pipe *a*, for admitting the steam, and the stop-cock *b*, for allowing the condensed water to escape.

This arrangement is most judicious, economising fuel to the utmost degree; because the steam of condensation which, in a Watts' engine, would be absorbed and carried off by the air-pump, is here turned to good account, in warming the air of ventilation during the winter months. Two hundred weight of fuel suffice for working this steam-engine during twelve hours. It pumps water for household purposes, raises the coals to the several apartments on the upper floors, and drives the fan ventilator. The air, in flowing rapidly through the series of cells, placed alternately between the steam-cases, cannot be scorched, as it is infallibly with air-stoves; but it is heated only to the genial temperature of from 75° to 85° Fahr., and it thence enters a common chamber of brick-work in the basement story, from which it is let off into a series of distinct flues, governed by dialled valves or registers, whereby it is conducted in regulated quantities to the several apartments of the building. I am of opinion, that it would not be easy to devise a better plan for the purpose of warming and ventilating a large house; and I am only sorry to observe, that the plan projected by the Engineers has been *injudiciously* counteracted in two particulars.

The first of these is, that the external air, which supplies the fan, is made to traverse a great heap of coke before it can enter that apparatus, whereby it suffers such friction as materially to obstruct the ventilation of the house. The following experiments, which I made recently upon this point, will place the evil in a proper light:—Having fitted up Dr. WOLLASTON'S differential barometer, as an anemometer, with oil, of specific gravity 0·900 in one leg of its syphon, and water of 1·000 in the other, covered with the said oil in the two cisterns at top, I found that

the stream of air produced by the fan, in a certain part of the flue, had a velocity only as the number 8, while the air was drawn through the coke, but that it had a velocity in the same place as number 11, whenever the air was freely admitted to the fan by opening a side door. Thus, three-elevenths, both of the ventilating and warming effect of the fan, are lost. I cannot divine any good reason for making the Members of the Reform Club breathe an atmosphere, certainly not improved, but most probably vitiated, by being passed, in a moist state, through a porous sulphurous carbon, whereby it will tend to generate the two deleterious gases, carbonic oxide and sulphuretted hydrogen, in a greater or less degree. It is vain to allege that these gases may not be discoverable by chemical analysis—can the gaseous matters, which generate cholera, yellow fever, or ague, be detected by chemical re-agents? No, truly; yet every one admits the reality of their specific virus. I should propose that the air be transmitted through a large sheet of wire-cloth before it reaches the fan, whereby it would be freed from the grosser particles of soot that pollute the atmosphere of London. The wire-cloth should be brushed every morning.

The second particular, which counteracts in some measure the good effects of the fan in steam ventilation—is the huge stove placed in the top story of the building. This potent furnace, consuming, when in action, 3 cwt. of coals per day, tends to draw down foul air, for its own supply, from the chimneys of the adjoining rooms, and thus to impede the upward current created by the fan. I have measured, by DR. WOLLASTON'S differential barometer, the ventilating influence of the said furnace stove, and find it to be perfectly insignificant,—nay, most absurdly so,—when compared with the fan, as to the quantity of fuel which each requires per day. The rarefaction of air in the stove chamber, in reference to the external air, was indicated by a quarter of an inch difference of level in the legs of the oil and water syphon, and this when the door of the stove-room was shut, as it usually is; the tube of the differential barometer being inserted in a hole in the door. The fan indicates a ventilating force equal to two inches of the water syphon, which is twenty inches of the above oil and water syphon, and therefore eighty times greater than that of the stove furnace; so that, taking into view the smaller quantity of fuel which the fan requires, the advantage in ventilation, in favour of the fan, is the enormous ratio of 120 to 1, at the lowest estimate. The said stove, in the attic, seems to me to be not only futile, but dangerous. It is a huge rectangular cast-iron chest, having a large hopper in front, kept full of coals, and it is contracted above into a round pipe, which discharges the burnt air and smoke into a series of horizontal pipes of cast-iron, about four inches diameter, which traverse the room under the

ceiling, and terminate in a brick chimney. In consequence of this obstruction, the draught through the furnace is so feeble, that no rush of air can be perceived in its ash-pit, even when this is contracted to an area of six inches square;—nay, when the ash-pit was momentarily luted with bricks and clay, and the tube of the differential barometer was introduced a little way under the grate, the level of the oil and water syphon in that instrument was displaced by no more than one-tenth of an inch, which is only one-hundredth of an inch of water,—a most impotent effect under a daily consumption of 3 cwt. of coals. In fact, this stove may be fitly styled an *incendiary coal devourer*, as it has already set fire to the house; and though now laid upon a new floor of iron rafters and stone flags, it still offers so much danger from its outlet iron pipes, should they become ignited from the combustion of charcoal deposited in them, that I think no premium of insurance adequate to cover the imminent risk of fire. The stove being, therefore, a superfluous and dangerous nuisance, should be turned out of doors as speedily as possible. Its total cost, with that of its fellow in the basement story, cannot be much less than the cost of the steam-engine, with all its truly effectual warming and ventilating appurtenances.

I take leave to observe, that the system of heating and ventilating apparatus, constructed by Messrs. EASTON AND AMOS, in the Reform Club House, offers one striking and peculiar advantage. It may be modified at little expense, so as to become the ready means of introducing, during the sultriest dog-days, refreshing currents of air, at a temperature of 10, 20, 30, or even 40 degrees under that of the atmosphere. An apparatus of this nature, attached to the Houses of Parliament and Courts of Law, would prove an inestimable blessing to our legislators, lawyers, judges, and juries. Of such cool air a very gentle stream would suffice to make the most crowded apartments comfortable, without endangering the health of their inmates with gusts of wind through the doors, windows, and floors.

It is lamentable to reflect how little has been done for the well-being of the sentient and breathing functions of man in the public buildings of the metropolis, notwithstanding our boasted march of intellect and diffusion of useful knowledge. Almost all our churches are filled on Sundays with stove-roasted air; and even the House of Commons has its atmosphere exhausted by the suction of a huge chimney stalk, with a furnace equal, it is said, to that of a 40-horse steam boiler. To gentlemen plunged in air so attenuated, condensation of thought, and terseness of expression, can hardly be the order of the day.

Nearly seven years have elapsed since I endeavoured to point public attention to this important subject in the following terms :—“ Our legislators, when bewailing, not long ago, the fate

of their fellow-creatures, doomed to breathe the polluted air of a factory, were little aware how superior the system of ventilation adopted in many cotton mills was to that employed for their own comfort in either House of Parliament. The engineers of Manchester do not, like those of the metropolis, trust for a sufficient supply of fresh air into any crowded hall, to currents physically created in the atmosphere by the difference of temperature excited by chimney draughts, because they know them to be ineffectual to remove, with requisite rapidity, the dense carbonic acid gas generated by many hundred powerful lungs.* At page 382, of the work just quoted, there is an exact drawing and description of the factory ventilating fan.

On the 6th of June, 1836, I took occasion again, in a paper read before the Royal Society, upon the subject of the *malaria* which then prevailed in the Custom House, to investigate the principles of ventilation by the fan, and to demonstrate, by a numerous train of experiments, the great preference due to it, as to effect, economy, and comfort, over chimney-draught ventilation. Yet at this very time, the latter most objectionable plan was in progress of construction, upon a colossal scale, for the House of Commons. About the same period, however, the late ingenious Mr. OLDHAM, engineer of the Bank of England, mounted a mechanical ventilator, and steam-chest heater, for supplying a copious current of warm air to the rooms of the engraving and printing departments of that establishment. Instead of a fan, Mr. OLDHAM employed a large pump to force the air through the alternate cells of his steam chest. He had introduced a similar system into the Bank of Ireland about ten years before, which is now in full action.

About two years ago, Messrs. EASTON AND AMOS were employed to ventilate the letter carriers' and inland office departments of the General Post Office, of which the atmosphere was rendered not only uncomfortable, but insalubrious, by the numerous gas-lights required there in the evenings. This task has been executed to the entire satisfaction of their employers, by means of fans driven by steam-engine power. The said engineers made, about the same time, a set of machinery similar to that erected at the Bank of England, for warming and ventilating the Bank of Vienna. They are justly entitled to the credit of having been the first to execute, in all its bearings, the system of heating and ventilating buildings, having special respect to the health of their inmates, which I urged upon the public mind many years ago.

As fans of sufficient size, driven by steam power with sufficient

* *Philosophy of Manufactures*, p. 380., published by Charles Knight.—London, 1835.

velocity to warm in winter, and ventilate at all times, the most extensive buildings, may be erected upon the principles above described, without causing any nuisance from smoke, it is to be hoped that the Chapel of Henry VII. will not be desecrated by having a factory Vesuvius reared in its classical precincts, and that the noble pile of architecture of the new Houses of Parliament, will not be disfigured with such a foul phenomenon.

13, Charlotte Street, Bedford Square,
January 26th, 1842.

Scientific Adjudication.

COMMON PLEAS.

BEFORE CHIEF JUSTICE SIR N. TYNDAL.

CRANE v. PRICE.

This was an alleged infringement of a patent for improvements in the manufacture of iron, which invention consists in the employment of anthracite or stone-coal, in a smelting furnace, the combustion of which is promoted by a blast of heated air.

The discussion of this question occupied the Court for three days, and a verdict was taken in favour of the plaintiff, subject to the opinion of the Judges, principally as to whether the use of a *hot blast*, (which had been previously employed in a smelting furnace, with ordinary fuel,) when applied to the fuel anthracite, a natural production, could be considered such an invention as would constitute a proper subject for a valid patent.

The Court took time to consider this question, and the decision will be given after the Assizes. We therefore postpone our report until that opinion is delivered, when we shall give the particulars of the whole case, which is one of great importance to patentees, as regards the question of applying known means to new purposes.

QUEEN'S BENCH.

BEFORE LORD CHIEF JUSTICE DENMAN,—FEB. 12TH, 1841.

THE QUEEN v. NICKELS.

This was a writ of *Scire Facias*, to repeal a patent granted 21st April, 1838, for improvements in machinery for manufacturing braid and other fabrics. No evidence was called, but the defects of the specification, in not pointing out what were the novel features, so as to distinguish them from the old parts, was pleaded, and a verdict, given thereon, pronounced the patent null and void. Some exceptions were, however, taken to the verdict, on the part of the patentee, which being allowed by the Court, the whole case may be considered as standing for a new trial.

Several matters, previously considered in Chancery, arising out of this patent, are connected with the subject, which, with the merits of the whole case, we shall fully explain when the ultimate decision is obtained.

List of Patents

That have passed the Great Seal of IRELAND, from the 17th January, to the 17th of February, 1842, inclusive.

To Samuel Hall, of Basford, in the county of Nottingham, civil engineer, for improvements in the combustion of fuel and smoke.—Sealed 9th February.

David Stead, of Great Winchester-street, in the city of London, merchant, for certain improvements in constructing or paving of public streets and highways, public roads, courts, paths, bridges, cottages, and other houses, with timber or wooden blocks,—and in the machinery or mode of manufacturing the said blocks,—part of which improvements have been communicated to him by a foreigner, residing abroad.—Sealed 11th February.

James Ions, of Newcastle-upon-Tyne, Gent., for improvements in smelting copper ores.—Sealed 11th February.

Julius Bordier, of Austin Friars, in the city of London, merchant, for certain improvements in preparing skins and hides,—and in converting them into leather,—being a communication from a foreigner, residing abroad.—Sealed 14th February.

John Steward, of Wolverhampton, in the county of Stafford, Esq., for certain improvements in the construction of piano-fortes.—Sealed 14th February.

Archibald Templeton, of Lancaster, in the county of Lancaster, silk spinner, for a new and improved method of preparing for spinning silk and other fibrous substances.—Sealed 16th February.

List of Patents

Granted for SCOTLAND, subsequent to January 22nd, 1841.

To Christopher Nickells, of York-road, Lambeth, Surrey, for improvements in the manufacture of napped fabrics.—Sealed 27th January.

John Jones, of the Smethwick Iron Works, near Birmingham, engineer, for certain improvements in steam-engines, and in the mode or methods of obtaining power from the use of steam,—part of which improvements are applicable to the raising or forcing water, and for other purposes.—Sealed 4th February.

James Thorburn, of Manchester, machinist, for certain improvements in machinery for producing knitted fabrics.—Sealed 4th February.

Nathaniel Benjamin, of Camberwell, Surrey, for improvements in the manufacture of type,—being a foreign communication.—Sealed 11th February.

Louis Sachenal, of Tichfield-street, Soho, London, mechanic, and Antoine Vieyres, of Pall Mall, watch maker, for improvements in machinery for cutting cork.—Sealed 11th February.

John George Bodmer, of Manchester, engineer, for certain improvements in propelling vessels on water, part of which improvements apply also to steam-engines to be employed on land.—Sealed 14th February.

George Mannering, of Dover, plumber, and Henry Harrison, of Ashford, both in the county of Kent, plumber, for certain improvements in the means of raising water, and other purposes.—Sealed 16th February.

New Patents

SEALED IN ENGLAND.

1842.

To John James Baggaly, of Sheffield, seal-engraver, for certain improvements in combs for the hair, and which are also applicable to combing other fibrous substances.—Sealed 29th January—6 months for enrolment.

Joseph Hughes, of Whitehall Mills, Chapel-le-Frith, Derby, paper maker, for certain improvements in the method or process of manufacturing paper.—Sealed 29th January—6 months for enrolment.

James Hunt, of Whitehall, Middlesex, Gent., for improvements in the manufacture of bricks.—Sealed 31st January—6 months for enrolment.

Charles Wye Williams, of Liverpool, Gent., for certain improvements in the making and moulding of bricks, artificial fuel, and other substances.—Sealed 31st January—6 months for enrolment.

Henry Fowler Broadwood, of Great Pulteney street, Golden-sq., Esq., for an improvement in that part of a piano-forte, harpsichord, or other the like instrument, commonly called the "name board."—Sealed 2nd February—6 months for enrolment.

William Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for certain improved apparatus to be adapted to lace-making machinery, for the production of a novel description of elastic fabric from silk, cotton, woollen, linen, and other fibrous materials,—being a communication.—Sealed 8th February—6 months for enrolment.

Adderley Willcocks Sleigh, K.T.S., of Manchester, Captain, in Her Most Faithful Majesty's Service,—for a certain method or certain methods of effecting and forming sheltered floating harbours of safety, by the employment of certain buoyant sea barriers, applicable thereto,—and which said improvements are also applicable to and useful for the formation of break-waters, floating bridges, light-houses, and beacons; the protection of pier-heads, embankments, and for other similar purposes.—Sealed 8th February—6 months for enrolment.

Charles Hancock, of Grosvenor-place, artist, for certain improvements in printing cotton, silk, woollen, and other stuffs.—Sealed 8th February—6 months for enrolment.

Benjamin Biram, of Wentworth, Yorkshire, colliery viewer, for certain improvements in the construction and application of rotary engines.—Sealed 8th February—6 months for enrolment.

Frederick Harlow, of Rotherhithe, carpenter, for improvements in paving or covering roads and other surfaces, and in machinery for cutting the material to be used for those purposes.—Sealed 9th February—6 months for enrolment.

Isham Baggs, of King's-square, Middlesex, chemist, for improvements in obtaining motive power, by means of carbonic acid; and also by a peculiar application of heated air.—Sealed 9th February—6 months for enrolment.

Christopher Nickels, of York-road, Lambeth, Gent., for improvements in the manufacture of plaited fabrics.—Sealed 10th February—6 months for enrolment.

William Brook Addison, of Bradford, manufacturer, for certain improvements in machinery for spinning worsted and woollen yarn.—Sealed 10th February—6 months for enrolment.

George Jarman, of Leeds, flax spinner, Robert Cook, of Hathersage, Derby, heckle and needle manufacturer, and Joshua Wordsworth, of Leeds, aforesaid, machine maker, for certain improvements in machinery for spinning flax, hemp, and tow.—Sealed 14th February—6 months for enrolment.

James Andrew, of Manchester, manufacturer, for certain im-

provements in the method or process of preparing or dressing yarns or warps for weaving.—Sealed 15th February—6 months for enrolment.

Charles Thomas Holcombe, of Bankside, Southwark, iron merchant, for certain improvements in the manufacture of fuel, and in obtaining products in such manufacture.—Sealed 15th February—6 months for enrolment.

John Osbaldeston, of Blackburn, Lancaster, metal heald maker, for improvements in looms for weaving.—Sealed 15th February—6 months for enrolment.

Alexander Rousseau, of the Strand, manufacturer, for improvements in fire-arms,—being a communication.—Sealed 15th February—6 months for enrolment.

George Haden, of Trowbridge, Wilts, engineer, for certain improvements in apparatus for warming and ventilating buildings.—Sealed 15th February—6 months for enrolment.

John Lewthwaite, of East-street, Manchester-square, engineer, for improvements in steam-engines and boilers.—Sealed 15th February—6 months for enrolment.

Thomas Russell Crampton, of Lisson Grove, engineer, and John Coope Haddan, of Moorgate-street, London, civil engineer, for improvements in steam-engines and railway carriages.—Sealed 15th February—6 months for enrolment.

Robert Wornum, of Store-street, Bedford-square, piano-forte-maker, for improvements in the actions of piano-fortes.—Sealed 15th February—6 months for enrolment.

Daniel Greenfield, the Elder, of Birmingham, brass-founder, for an improvement in the manufacture of hollow metal knobs for the handles of door and other locks.—Sealed 21st February—6 months for enrolment.

Moses Poole, of Lincoln's-inn, Gent., for improvements in treating, refining, and purifying oils and other similar substances,—being a communication.—Sealed 21st February—6 months for enrolment.

CELESTIAL PHENOMENA FOR MARCH, 1842.

D. H. M.		D. H. M.	
1	Clock before the sun 12m. 39s.	18	Venus R. A. 0h. 4m. dec. 0.
—	☽ rises Morn.	—	56. S.
—	☽ passes mer. 3h. 28m. M.	—	Mars R. A. 1h. 29m. dec. 9.
—	☽ sets 7h. 35m. M.	—	13. N.
—	Occul Solitarii, im. 17h. 4m.	—	Juno R. A. 16h. 44m. dec. 8.
	em. 17h. 34m.	—	51. S.
2 18 15	☿ in conj. with ♀ diff. of dec.	—	Pallas R. A. 0h. 38m. dec. 5.
	5. 33. N.	—	18. S.
—	Occul Scorpii, im. 14h. 28m.	—	Ceres R. A. 2h. 28m. dec. 10.
	em. 15h. 26m.	—	15. N.
—	Occul = Scorpii, im. 17h. 11m.	—	Vesta ¹ R. A. 2h. 59m. dec. 13.
	em. 18h. 30m.	—	0. N.
3 1 19	☿ in inf. conj. with ☉	—	Jupiter R. A. 19h. 20m. dec. 22.
4 -1 22	☽ in ☐ or last quarter.	—	10. S.
5	Clock before the sun 11m. 48s.	—	Saturn R. A. 18h. 57m. dec. 22.
—	☽ rises 3h. 31m. M.	—	11. S.
—	☽ passes mer. 7h. 3m. M.	—	Georg. R. A. 23h. 40m. dec. 2.
—	☽ sets 10h. 36m. M.	—	51. S.
1 26	♀ in sup. conj. with ☉	—	Mercury passes mer. 22h. 38m.
10 44	♀ greatest Hel. Lat. S.	—	Venus passes mer. 0h. 22m.
16 23	♂'s first satt. will im.	—	Mars passes mer. 1h. 47m.
22 49	♂ in conj. with ☽ diff. of dec.	—	Jupiter passes mer. 19h. 35m.
	2. 6. N.	—	Saturn passes mer. 19h. 12m.
6 7 11	♂ in conj. with the ☽ diff. of	19 10 42	☽ in ☐ or first quarter,
	dec. 1. 10. N.	20	Clock before the sun, 7m. 43s.
8 23	☽ in Apogee.	—	☽ rises, 10h. 12m. M.
10	Clock before the sun, 10m. 34s.	—	☽ passes mer. 6h. 55m. A.
—	☽ rises 5h. 39m. M.	—	☽ sets 2h. 43m. M.
—	☽ passes mer. 10h. 53m. M.	12 13	☉ enters Aries,—Spring com-
—	☽ sets 4h. 19m. A.		mences.
12 8	☿ in conj. with ☽ diff. of dec.	21 4 46	☿ in the descending node
	0. 37. S.	22	Occul α^2 Cancr. im. 7h. 48m.
12 3 4	♀ in conj. with the ☽ diff. of dec.		em. 8h. 59m.
	6. 6. S.	—	Occul α^1 Cancr. im. 8h. 11m.
4 29	Her. in conj. with the ☽ diff. of		em. 8h. 48m.
	dec. 5. 29. S.	24 11	☽ in Perigee.
6 29	Ecliptic conj. or ☉ new moon.	24 21 48	♂ in the descending node
12 3	♀ in conj. with Her. diff. of dec.	25	Clock before the sun, 6m. 11s.
	0. 45. N.	—	☽ rises, 5h. 24m. A.
18 16	♂'s first satt. will im.	—	☽ passes mer. 11h. 28m. A.
14 9 48	♂ in conj. with the ☽ diff. of dec.	—	☽ sets, 5h. 0m. M.
	5. 39. S.	25 15 25	♂'s second satt. will im.
18 46	Her. in conj. with ☉	26	Occul η Virginus, im. 6h. 12m.
15	Clock before the sun, 9m. 12s.		em. 7h. 3m.
—	☽ rises 6h. 48m. M.	26 1 57	Ecliptic oppo. or ☉ full moon
—	☽ passes mer. 2h. 22m. A.	28 16 32	♂'s first satt. will im.
—	☽ sets 10h. 12m. A.	29 5 36	♀ in conj. with Pallas
10 84	☿ stationary.	10	♂ in the ascending node
18	Juno in Aphelion	30 7 43	♀ greatest elong. 27. 47. W.
—	Mercury R. A. 22h. 23m. dec.	31 8 17	☿ in Aphelion
	9. 16. S.		

J. LEWTHWAITE, Rotherhithe.

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CONJOINED SERIES.

No. CXXIV.
Recent Patents.

*To CHARLES EDWARDS AMOS, of Great Guildford-street,
in the Borough of Southwark, millwright and engineer,
for certain improvements in the manufacture of paper.*
—[Sealed 10th November, 1840.]

THESE improvements in the manufacture of paper, consist, firstly, in gradually lowering the roll of the engine in which the rags are prepared and converted into pulp; secondly, a mode of regulating the supply of pulp to the paper-making machine, in order to produce papers of any required thickness; thirdly, an improved sifter or strainer, through which the pulp is passed, for the purpose of arresting the knots and lumps; fourthly, certain novelties in the construction, arrangement, and action of parts of the machine, in which the pulp is deposited, that is moulded or made into continuous lengths of paper; fifthly, an improved method of heating the cylinders of the apparatus, whereby the newly made paper is dried; and sixthly, improvements in the machinery, by which the continuous length of paper is cut up into sheets of any required dimensions.

The machinery, for beating or grinding the rags into pulp, is shewn in Plate VII., fig. 1, being an elevation of the machine, and fig. 2, an end view of the same.

In the end of the water-wheel shaft, shewn at *x*, is an excentric pin, which acts as a crank, and transmits motion through the rods *a, a, a*, and the bell-crank levers *b, b*, to the lever *c*, which hangs upon a pin, fixed in the side of the engine.

On the lever *c*, a pall *d*, is mounted, which takes into the teeth of a ratchet-wheel *e*, fixed upon an axle, turning in a bracket, attached to the side of the engine. On this axle there is a worm or endless screw *g*, working into a worm-wheel *h*, upon the upright shaft *i*; and on this shaft *i*, a screw-thread is cut, which works in a box or nut *j*, in order to raise or lower it.

A long lever *k*, is attached by a pivot at one end to the side of the engine, and its other end is supported by the box or nut *j*. Near the middle of the lever *k*, the sliding plummer-box *l*, has its bearing, in which the axle *m*, of the engine-roll *n*, is supported; and a corresponding motion may be transmitted, in any convenient manner, to a similar lever *k*, on the opposite side of the engine, if thought desirable.

The roll being, at the commencement of the work, placed in its highest position, in order to perform light work, the rotation of the water-wheel shaft, or other first mover, through the cranks and rods *a, a*, and *b, b*, gives a continuous vibrating action to the lever *c*, and hence causes the click *d*, to produce an intermittent rotary movement of the ratchet-wheel and its worm-shaft *g*, which, by turning the worm-wheel *h*, and its vertical shaft *i*, gradually lowers the screw-box *j*, and thereby allows the lever *k*, and plummer-block *l*, to descend and let down the roll *n*, nearer to the plate.

As all kinds of rags cannot be beaten off in the same

time, it becomes necessary that the means of altering the speed, at which the roll is lowered, should be perfectly under control;—this is effected in the following manner:—

The lever *c*, at the bottom of its stroke, rests upon a stop 1, fastened to the engine side. On the rod *a*, an adjusting-box 2, is fitted, having a right-hand screw cut on the one end, and a left-hand screw on the other. By turning the handle 3, the rod *a*, is shortened or lengthened at pleasure; if shortened, the stud 4, of the rod *a*, more quickly catches the lever *c*, and gives a greater extent of motion to the pall *d*, which will cause the roll *n*, to be sooner depressed; if the rod is lengthened, the effect will be the reverse.

The patentee claims the invention of gradually lowering the roll in the vessel, known to paper-makers by the name of engine, (whether used for the purpose of washing, breaking, or beating rags,) by means of self-acting machinery, worked by the same rotary power as the engine itself, and which self-acting machinery can be regulated as to the velocity with which it acts upon the engine roll.

The machine, for regulating the supply of pulp, is shewn at figs. 3, 4, and 5,—fig. 3, being a longitudinal vertical section; fig. 4, a section, taken in the line *w, x*; and fig. 5, a section in the line *y, z*, of fig. 3. This apparatus is made to work in the following manner:—

The stuff or pulp is to be let out of the stuff-chest, through the shoot *A*, (see fig. 5,) into the weigh-box *B*; when a sufficient quantity of pulp is admitted to over-balance the power of the weighted lever *c*, the box *B*, will descend and close a slider or valve *a*, in the shoot, and prevent, for a time, any further flow of pulp through the shoot *A*. The box *B*, is fastened to the scoop case *B'*, by loose leather or caoutchouc cloth joints *b*, to admit of motion in the arc of a circle.

The back-water is collected in the usual way, by the dripping pan, and flows from thence through the shoot *e*, (see fig. 4,) into the scoop-case *D*; the quantity so discharged, is regulated by a sliding shutter *G*, which can be raised or lowered at pleasure. When the shutter *G*, is down to the line *c, c*, the back-water will run off through the opening, the quantity so discharged being according to the depth to which the shutter *G*, is lowered; and a pendant valve *F*, will prevent the pulp from running off to waste with the back-water.

A copper or iron spindle *c*, passes through both the scoop-boxes or cases *B*¹, and *D*; and on this spindle is keyed arms, with two sets of scoops, which are made to revolve in the cases *B*¹, and *D*, by the cog-wheel *H*, upon the end of the shaft, which is driven by the pinion *I*, on the shaft *J*, of the rigger *K*.—This rigger carries a strap, which receives motion from the shafting of the mill. By the rotation of the scoops, the pulp from the case *B*¹, is delivered into a sliding shute *L*, which discharges it through the trough *M*, into the case *D*.

In order that the paper may be made of any certain required weight or thickness, the machine must be adjusted thus:—If the paper is to be made thinner, the receiving shute *L*, must be moved forward by the rack *m*, and pinion *n*, a portion of the pulp from the scoops working in the case *B*¹; then fall down into the scoop-case, instead of being delivered into the shute *L*; the pulp and back-water may thus always be delivered into the case *D*, in quantities equal to the speed or going of the paper-making machine.

The patentee claims the combination of machinery herein described, or any modification of the same machinery which will regulate the quantities of pulp and back-water, according to the speed at which the paper-machine may be working.

The strainer, for separating the knots and grit from the pulp, is shewn at figs. 6, 7, and 8. Fig. 6, is a horizontal view of the strainer or sifter; fig. 7, is a side elevation of the same; and fig. 8, is a section, taken in the line E, F, of fig. 6.

The pulp is discharged from the lifters, or from the stuff-chest, into a compartment of the box marked *a*. Motion is then given to a wooden flap or clapper *c*, which is made air-tight to the box, at its edges, by leather or by a caoutchouc cloth. This flap, being raised and depressed, causes an undulating movement of the water and pulp in the box, passing through the plates, by the pressure of the atmosphere and the head of pulp and water in the box *a*; the knots, grit, &c., are thus left behind in the box, under the plates *b, b*.

On the ends of the shaft *e*, are keyed the crank-plates *f*, the rigger *g*, of different diameters, and the fly-wheel *h*. By means of these crank-plates, when they revolve, motion is given to the clapper *c*, which is united to the crank-plates by the connecting-rods *i*.

A copper or brass perforated plate *j*, is to prevent the pulp settling or subsiding at the bottom of the box *d*, which is effected by the pulp passing and repassing through the holes formed therein. The sieves *b*, and the plate *j*, also may, if required, be fastened to the box by joints, for the purpose of allowing them to turn up for cleaning.

The patentee claims the combination and the manner of working the pulp through the sieves by the action of the clapper *c*, the sieves remaining quiescent.

The paper-making machine is intended to produce, as nearly as possible, that particular kind of shake or movement of the web and table, given to the mould by the vat-man, when making paper by hand, on the old principle, which movement affords greater facility in closing or felting

the pulp in a more efficient manner than any of the machines heretofore in use.

Fig. 9, represents a longitudinal elevation of the improved machine for making paper, and fig. 10, is an elevation, taken at the left-hand end of the same.

A shaft *a*, working upon the bearings *b*, *b*, affixed to the side standard frames *q*, *q*, supports the rocking arms or bent levers *c*. A similar shaft *d*, working in the bearings *e*, also affixed to the standard frame, supports the arms or levers *f*, *f*. At the upper ends of each of the bent levers *c*, and also of the levers *f*, there is a recess *g*, and *h*, in which pivots or gudgeons *i*, *i*, extending from the ends of the table *j*, *j*, are supported; and hence, by the vibratory action given to the levers *c*, and *f*, the table receives its required shaking or rocking movements. To this rocking part of the machine are attached the breast-roller *k*, the couch-rollers *l*, *l*, the guide-rollers *m*, *m*, *m*, (which carry the endless wire web,) the stretch-roller *n*, for tightening the wire web, the dandy roller *o*, and the deckle-straps and frames *p*, *p*, all of which are well understood, and therefore need no further description.

On the axle of the lower couch-roller *l*, a cast-iron rigger *s*, is placed, for the purpose of driving the deckles by the strap *r*. On the side of the rigger *s*, there are two cheeks, forming part of the universal joint *t*.

Motion is given to the shaft *u*, by a strap, passed round the rigger *v*; which strap is led off from the driving motion of the press-rolls, in the usual way, and carries the wire web onward from the breast-roll *k*, to the couch-rolls *l*, *l*. The shaking movement of the table is produced by a crank *w*, on the shaft *x*, on which is fixed the fly-wheel *y*, and the rigger *z*, driven by a strap from the driving-shaft of the mill.

The rocking movements of the machine are balanced by

the weight w^1 , affixed to a tail-lever, extending from the shaft d . As the shaft x , goes round, the crank w , raises and depresses the tail-lever and weight w^1 , and causes the lever f , and studs i , in the bearings h , to work in the dotted arc shewn at 1, 2, whilst the other studs i , in the bearings g , work in a similar manner in the arc 3, 4. The arm f , is shorter than the arm c , consequently it will pass through an arc, subtending a larger angle or a greater number of degrees of the circle than the arm c ; and the combined motions of these arms will produce an undulating movement of the table.

The patentee claims the general arrangement by which the particular kind of curvilinear or undulating motion of the table is gained from the combined action of the vibrating levers c , and f , as described.

In order to facilitate the discharge of the water from the pulp, as it passes over the table, and to enable what is called wet stuff to be used with convenience,—the small brass or copper tubes, constituting the support of the wire web, are fastened to the side-frames of the table, instead of allowing them to turn in the ordinary way.

These tubes are cylindrical and hollow, each having a row of counter-sunk or other holes, extending along the upper part of its periphery, as shewn at fig. 11. One end of each tube is closed at b , the other end open at c , for the purpose of discharging the water. These open ends of the tubes are made conical, and are inserted into corresponding apertures in the side-frame j , of the table; along which side-frame there extends a tubular passage j , for the flow of the water. The manner of fastening these tubes into the side-frames of the table, is shewn in the drawing; and it will be seen that there is, opposite the open end of each tube, a screw-plug d , which may be advanced, if required, to close the water-passage of any or all of the tubes.

In order to promote the rapid discharge of the water from the travelling wire web, an air-pump is employed, and through the flexible tube *b*, fig. 9, the air from the passage *j*, is exhausted, which causes the water to run with great facility through the counter-sunk holes into the hollow tubes, and thence through the passage *j*, into the air-pump.

The patentee claims the use of small tubes, perforated with apertures as holes, or with slots, cut longitudinally, the tubes forming the table, over which the wire passes; also the means by which the flow of water, through the tubes, can be stopped at pleasure.

Paper made on the ordinary Fourdrinier's machine, has a disadvantage, arising from the lower side of the pulp being formed first into paper, while the upper side is in a fluid state, the water having to pass through the paper previously made, thereby disturbing the fibre, and not producing so even a surface as might be wished. To obviate this, a modification of the foregoing machine, shewn at fig. 12, is used. *c, c*, are the centres of motion of the vibrating levers; *A, B*, the side-frames, carrying the rollers and other parts used in paper machines of the ordinary construction.

The shaking movement is given by a crank *D*, to the connecting-rod *E*, and one of the arms *F*, which arms are made fast to the spindles *c*. In order to alter the angle of elevation, the end of the side-frame *B*, and the bearings *G*, are adjusted by the handles *H*. *B*, is the breast-roll end, or the point at which the stuff flows on the wire. *A*, the couch-roll end, or the point at which the paper leaves the wire, the wire travelling on the upper side from *B*, to *A*, during the time the pulp is on it.

The patentee claims any modification of levers, arms, rods, or chains, for bearing or supporting the frame of the table on which the pulp is formed, where more than two

bearings or points of support are used, (exclusive of the joint of the connecting-rod, by which the shaking movement is given,) when the side-frames, in the lines, carry all the rolls, tubes, &c., which belong to the wire table.

The improved method of heating and drying cylinders, is by means of hot air, instead of using steam in the usual way; for this purpose, a stove or furnace, for the burning of coke, Welch or other coals, is employed, and the gaseous products or vapours, arising from combustion, are received into a chest or chamber, the temperature of which is regulated by an air or other thermometer. From this chamber or hot air chest, the heated gases or vapours are conducted by a pipe, which has other branches, leading to each of the drying cylinders, the necks of which are larger than when steam is used, for the purpose of allowing larger openings to and from the cylinders; the remaining heat is collected in pipes after leaving the cylinders, and may then be applied to any other purpose of drying. Circulation may be caused by a fan, by exhaustion, or a chimney draught. The whole product of heat, arising from the combustion, is thus beneficially used, and the fuel thereby economised.

The patentee's claim is for heating the drying and other cylinders, by turning the burnt air or vapour, arising from combustion, through the cylinders; also the equalization of those vapours, by the admission of common air, when used for the purpose there described.

In the machine at present used for drawing the paper towards the cross cutting knives, and regulating the length of the sheet, the paper is conducted by rolls, one of which, termed the gathering roll, has another working upon it, after the manner of a pair of press-rolls. These gathering rolls are sometimes allowed to remain quiescent during the time the knives are cutting the cross-cut. In other cases, the gathering-roll is going at the time the cross-cut knife is

in action. The paper is then held in a press, and a dancing-roll takes up the slack occasioned by the stoppage of the paper at the press. The difference in the length of the sheet, in this last case, is regulated by a cat-gut band passing over a pair of expansive pulleys, or by a pair of conical pulleys.

The desideratum, in the first case, (where the gathering-roll is stopped,) is to obviate the ill effects caused by the inertia having so suddenly to be overcome, and the point of contact, between the gathering and the press-roll, being so small, whereby a slipping frequently occurs, and consequently differences are made in the lengths of the sheets of paper. In the other case (where the gathering-roll is kept in action during the cross-cut) the cat-gut band or straps used, frequently slip; and when this occurs, a difference in the length of the sheet always happens. To remedy these defects, a flat press or holder is used, the bottom clamp of which slides upon a guide on the frame of the machine; this clamp is connected by a rod to a crank, the shaft of which passes across the machine. This crank is formed by a sliding plate, in order that the radius or throw may be altered; the alteration of which will regulate the length of the sheet of paper. An upper clamp is also fitted to the sliding-press, in such a manner, that it is in contact with the lower clamp, during the time the press is drawing the paper towards the cross-cut knife, or during the time the crank is making one-half revolution.

When the sliding-press has made the stroke due to the radius of the crank in this direction, the upper clamp is raised by means of a cam, keyed on the crank-shaft, while a second press interposes and holds the paper fast, in a similar way, during the return or back-stroke of the first press;—the upper clamp of the sliding press remains up during the time this stroke is making.

The second press is made similar to the sliding-press, only that one clamp remains at all times quiescent, but the moveable clamp is raised, by suitable cams, on the crank-shaft; when the upper clamp of the sliding-press is up, the moveable clamp of the quiescent-press is down. The crank-shaft also drives the cross-cut and circular knives. The width of the clamps in the presses may be about four inches, and covered with thin felt.

The patentee claims flat sliding and quiescent-presses, here described; also the right to such presses, whether the moveable press works on guides or slides, or in the arc of a circle, by a single lever or a combination of levers.—[*Enrolled at the Petty Bag Office, May, 1841.*]

Specification drawn by Messrs. Newton and Berry.

To THOMAS ROBERT SEWELL, of Carrington, in the county of Nottingham, lace manufacturer, for his invention of certain improvements in obtaining carbonic acid from certain mineral substances.—[Sealed 31st December, 1840.]

THE object of these improvements is to obtain carbonic acid, in nearly a pure state, and at a small expense. The manner proposed, is heating certain mineral substances to a red heat, in vessels from which the carbonic acid evolved can be conducted to gas-holders, and there preserved for use.

Various methods have been adopted to obtain carbonic acid, such as the combustion of charcoal in atmospheric air, and the decomposition of native earthy carbonates, through the agency of sulphuric or of muriatic acid. The first of these methods yields carbonic acid, mixed with large portions of atmospheric air and other gases, which impede or retard its action upon the substances with which it is in-

tended to be combined; and the latter is attended with great expense, arising from the cost of the strong acid employed. This latter method yields the carbonic acid in a comparatively pure state, which is extremely desirable for most purposes of manufacture, and although the cost is very great, has been preferred in many cases to the cheaper method of producing the acid by the combustion of charcoal in atmospheric air.

The mineral substances used in this improved process are those containing a large proportion of carbonate of magnesia, known by the names of bitter spar, dolomite, and magnesian limestone; or that description of iron-stone, possessing a large proportion of carbonate of iron; but minerals which contain carbonate of magnesia are preferred.

These minerals, or any of them, (say in pieces from one ounce weight upwards to not exceeding about two pounds,) are placed in an ordinary retort, and heated to a red heat, in which state they give off carbonic acid gas in great abundance. This gas is to be conducted into an hydraulic main, and from thence into a purifying vessel, containing small gravel or coarse sand, or a mixture of them, or any similar granular substances, which are to be moistened with water, or a dilute solution of soda, through the interstices; between which granular substance the gas must be passed, in order to arrest any particles of dust, or of decomposed organic matter which such minerals usually contain; and from this vessel the carbonic acid gas may be conducted into an ordinary gas holder, and there retained for use.

The patentee claims the use of the above-mentioned minerals, when heated in such vessels as will admit of the carbonic acid being conducted and collected into receivers, as above stated.—[*Inrolled at the Petty Bag Office, June, 1841.*]

Specification drawn by Messrs. Newton and Berry.

To WILLIAM MC MURRAY, of Kenteith Mill, Edinburgh, paper-maker, for certain improvements in the manufacture of paper.—[Sealed 1st July, 1840.]

THIS invention relates to a method of drawing off the water from a rotatory pulp-strainer, employed for paper-making, which is effected by means of a syphon placed therein in such a manner as not to impede the progress of the pulp in working.

In Plate VIII., is a section, taken through the strainer and pulp-engine, used for reducing the rags to be manufactured into paper. *a, a*, is an ordinary cylindrical strainer, made of wire web, with closed ends, connected together by longitudinal rails, over which the wire web or cloth is drawn. This strainer is mounted on a hollow axle or tube *b, b*, set in bearings on the middle partition and side of the engine. Two tubes *c, c*, descend from the hollow axle *b, b*, to near the bottom of the strainer, but not so low as to touch the rails as it revolves; *d*, is a continuation of the tube *b*, and is furnished with a stop-cock *e*. To this pipe is connected a small one, with a stop-cock and funnel at its upper end.

The action of the apparatus, for withdrawing the water from the strainer, is as follows:—The stop-cock *e*, being closed, water is supplied to the pipe *f*, through the funnel, until the tubes *b, c*, and *d*, which form a syphon, are filled and the air is expelled through a small cock *g*; this being accomplished, the cock *g*, and that in the tube *f*, are closed, and the cock *e*, opened, when the water, contained in the strainer, will flow up the tubes *c, c*, along the tube *b*, and down the tube *d*, in a continuous stream.

The patentee claims the method of withdrawing water from suitably-constructed rotary strainers of paper-engines, by means of syphons.—[*Inrolled in the Inrolment Office, January, 1841.*]

saturated solution of acetate of ammonia, and the solution of silver, thus produced, is ready to be employed for silvering the articles above mentioned. Instead of this mode, the solution may be made by dissolving an iodine of silver in prussiate of potash, or any of the ammoniacal salts.

The sixth improvement consists in covering metallic picture and other frames and surfaces with platinum, by means of voltaic electricity.

Two sorts of solutions are described;—the first is produced by boiling a quantity of platino-bichloride of ammonia, for ten minutes, in sixty times its weight of water, to which three parts of muriatic acid have been added; the second is made by putting spongy platinum into a quantity of bromine, mixed with its bulk of alcohol, and stirring or shaking the whole, in order to dissolve the platinum. To this solution, half its bulk of sulphuric acid, diluted with six times its weight of water, is added, and the solution is then ready for use. These solutions are employed in the same manner as the gold and silver solutions before mentioned, except when covering surfaces of lead with platinum; which surfaces may, amongst other things, be used for the negative element or plates of galvanic batteries.

The mode of covering surfaces of lead with platinum, is as follows:—The lead, after being cleaned, is immersed for six hours in water, mixed with either of the solutions of platinum, in the proportions of an ounce of the solution to a gallon of water; at the end of this time it will be coated with platinum, which may be known by its having changed to a dark brown colour. If it is desired that the lead should be more permanently coated, it is connected with a voltaic battery, and the strength of the solution doubled.

The seventh improvement consists in covering metallic picture and other frames and surfaces with tin, by means of voltaic electricity, using for that purpose a solution of acetate or muriate of ammonia, or sulphate of soda.

The eighth improvement consists in cleaning iron surfaces, and covering them with copper, by means of voltaic electricity.

The voltaic battery employed, consists of three pairs of plates, each plate having as much surface as the iron to be cleaned, and to the platinum end of the battery the iron is attached, another surface of iron being connected to the zinc end of the battery, and the two surfaces immersed in a saturated solution of sulphate of soda. The battery is now excited into action, and in a few minutes the iron will be ready to be deposited on, which may be known by the surface becoming bright, if it is malleable iron; and if cast-iron, by the immediate surface being deprived of its iron, and the carbon contained in it exposed. The iron is now connected to the zinc end of a battery, similar to that just mentioned, the platinum end being attached to a piece of copper; the iron and copper are then immersed in a solution of a salt of copper, and the battery being put in action, the requisite thickness of copper is deposited on the iron.

The ninth improvement consists in producing enriched surfaces on picture and other frames, cornices, and other interior decorations, by the use of embossed or enriched calico, or other similar fabric.

The fabric is embossed by pressing it between rollers or blocks, having the desired pattern formed on their surfaces; it is then cut into pieces of the required size, and after the back has received a coat of thick whiting, for the purpose of filling up the hollow spaces of the fabric, and causing them to be perfectly solid when dry, the embossed pieces are fastened on the surfaces to be ornamented or enriched.

The tenth improvement consists in the application of caoutchouc or India-rubber to the composition employed for forming ornaments for picture and other frames.

The caoutchouc is dissolved in spirits of turpentine, asphalte, pyroligneous spirit, or spirit of tar, and used in the proportion of one pound to every six pounds of glue used in the composition.

The patentee's claims are as follow:—First, the application of voltaic electricity to the manufacture of picture and other frames, as described.

Second.—The application of voltaic electricity to the manufacture of moulds for making ornaments in papier machée, glass, china, &c.

Third.—The application of voltaic electricity for the purpose of making patterns or moulds, for iron-founders, in copper.

Fourth.—The use of bromine and iodine, combined with gold, in conjunction with voltaic electricity, for the purposes mentioned under the fourth improvement.

Fifth.—The use of bromine and iodine, combined with silver, in conjunction with voltaic electricity, for the purposes mentioned under the fifth improvement.

Sixth.—The use of the solution of platinum first described, in conjunction with voltaic electricity, for covering metal surfaces with platinum; and likewise the use of bromine, combined with platinum, in conjunction with voltaic electricity, for covering metal surfaces with platinum; also the covering lead with platinum, and applying it, for the first time, to the uses hereinbefore mentioned.

Seventh.—Covering the surfaces, mentioned in the fourth improvement, with tin, by the method herein described.

Eighth.—The method of cleaning iron surfaces, and the regulation of the quantity and intensity of electric force, necessary to render iron fit to be deposited on.

Ninth.—The method of producing embossed or enriched surfaces on picture and other frames and cornices,—being also applicable to other interior decorations.

Tenth.—The application of cautochouc to the purpose mentioned in the tenth improvement.—[*Inrolled in the Petty Bag Office, September, 1841.*]

To ALEXANDER PARKES, of Birmingham, artist, for certain improvements in the production of works of art in metal, by electric deposition.—[Sealed 29th March, 1841.]

THESE improvements consist in manufacturing articles in gold and silver, such as busts, vases, drinking vessels, the branches of chandeliers, &c., by depositing the metals, by the electrotype process, in or upon suitable moulds or models.

The moulds or models are removed after the article is formed, and for this purpose, are either made of metal, in parts, by electric agency or other means, or when whole, of stearine wax, or fusible metal, so as to admit of their removal by the application of heat; or they may be made of copper, and removed by dissolving them in muriatic acid, used in a hot state, in combination with colcothar, (per-oxide of iron.)

If the articles are not sufficiently strong when the moulds are removed, they are strengthened by depositing copper or any other suitable metal within them, by means of electricity, or by filling them with fusible metal or other materials.

The patentee claims, firstly, the mode generally of manufacturing articles of gold or silver, by depositions thereof, caused by electric agency, in or on suitable moulds or models, which may be removed from the articles of gold or silver, when the same have been formed.

To obtain a regular roughness, sufficient to retain the printing ink, and at the same time to produce an appropriate "texture," various modes of "handling" may be employed; for instance,—a flat tint, made by spreading the composition over the plate, and striking a fitch or hog-hair brush perpendicularly all over it, will give an impression in the electrotint plate, that will retain the printing ink by numerous minute indentations.

Cut brushes, of different sorts, make a series of continuous lines on the plate, of different degrees of fineness, which form corresponding indented lines in the electrotint plate, capable of receiving and transferring the ink, so as to produce the same effect on paper or other material, as had been previously obtained on the first plate; a mixture of these styles of handling will also be found useful. "A dragged" texture is produced by passing a soft brush, held in a standing position, quickly over the surface, the brush being filled with the composition, slightly thinned with spirits of turpentine.

The composition employed in the electrotint paintings, is composed of one part, by weight, of white wax, two of lard, and one of lamp black, melted together, and stirred till nearly cold; after which, the composition is ground with a small quantity of olive oil. This composition never dries, and consequently can be removed from the plate, or its position altered at pleasure; it should be made thin enough to work freely, and yet sufficiently firm to retain the position it is placed in without spreading. For a washy texture, the composition is made by mixing equal parts of wax and ivory black, and grinding them with olive oil, thinning the mixture with spirits of turpentine.

When the painting is finished, it is slightly touched in the dark parts, by means of a soft pencil, with plumbago, or other suitable material, for the purpose of making the

surface conducting, and submitted to the electrotype process; by which means, a metal plate is produced, capable of transferring to paper, or other material, a fac-simile of the original painting.

A raised printing surface is obtained by means of the second part of this invention, in the following manner:—

The required subject is painted on a darkened or black copper, or other plate, with a white or light-coloured material, so as to produce the effect intended, by means of such brushes or tools, as will leave the composition in lines or dots, capable of making an impression in the electrotint plate, that will not come in contact with the printing roller; whilst those parts of the darkened copper that are left visible, either in lines or dots, will, when electrotyped, receive the ink from the roller, and when printed from, transfer an impression to paper, or other material. The intermediate shades between black and white, are produced by painting with cut brushes, which will leave lines, or points of composition, of considerable projection; and broad portions of light may be obtained, by heaping on the composition to the thickness of one-eighth of an inch, or more, in proportion to the required size of the masses of white. Flat tints, for flesh, back-grounds, &c., are formed by striking a fitch, or other brush, perpendicularly on the composition, so as to produce a great number of projecting points, which make corresponding indentations in the electrotype plate, too deep to receive any ink from the roller.—A “dragged” texture is produced in the manner described in the first part of this invention.

When the painting is finished, the surface of the composition is rendered conducting, and a metal plate is formed on it by electric deposition, which is capable of being used for printing on paper, or other material.

The composition used in this instance, is composed by

melting together two parts, by weight, of sulphate of lead, two of lard, and one of wax, stirring the mixture till nearly cold, and grinding it well previous to using it. In case it is too thick, it may be thinned with a little olive oil, and if too thin, more of the sulphate of lead may be added.

The patentee states in conclusion, that in addition to these electrotint surfaces, producing impressions of a novel kind, on paper or other material, of the original painting, they are also capable of being used for printing china, pottery-ware, music, maps, and portraits.

The patentee claims the mode, herein described, of producing printing surfaces, by painting or drawing, with suitable composition, and obtaining electrotypes plates or other surfaces therefrom; and also, (in addition to their application to other purposes,) their application to the purposes of printing china, pottery-ware, music, maps, and portraits.—[*Inrolled in the Inrolment Office, December, 1841.*]

To ANTONIO JAMES MAYER, of Ashley-crescent, in the parish of St. Luke, in the county of Middlesex, Gent., for an improved machine for cutting splints for matches.
—[Sealed 4th December, 1839.]

THIS invention consists in a machine for cutting blocks of wood into splints for matches, in such manner, that the fibres of the wood will not be torn or destroyed, and the splints will be thereby rendered more tough and durable than when cut in the ordinary manner.

In Plate VII., fig. 1, is a side view of the machine; fig. 2, is a transverse vertical section of the same, taken through the pillar *a*; and fig. 3, is a plan or bird's-eye view of the

knives or cutting blades, shewing the way in which the blocks are cut into splints. *b*, is a series of horizontal knives, (called by the patentee gauge blades,) mounted in an oblong carriage *c*, that slides in grooved guides *d*, being moved backwards and forwards by the connecting rod *e*, attached to the fly-wheel *f*, which is mounted on the shaft *g*, driven by bands from a steam-engine.

The bevelled cutting edges of the knives *b*, are arranged part in one direction and part in the opposite direction, and protrude through an opening in a brass plate *h*, fixed to the carriage *c*, as far as is necessary to cut the splints one way, as shewn in fig. 3. To the hind end of the carriage *c*, parallel with the plate *h*, and consequently at right angles to the knives *b*, an oblique knife *i*, called the "following blade," is fastened, by which the splints are separated from the blocks, after they have been divided by the knives *b*;—*k*, is a metal plate or bed, screwed to the frame of the machine, upon which the blocks of wood *j, j, j*, to be cut into splints, are placed; and the front edge of the plate is brassed, and slightly bevelled upwards, for the purpose of making the blocks lie hollow, so as to allow for any inequality of surface on their under sides. In a slot, in the centre of the plate *k*, a rack *l*, moves, working in guides *m*, on the under side of the plate *k*. To this rack the bent arm *n*, is attached, which extends behind the blocks *j, j, j*, and presses them against the plate *h*, the workman turning the handles *o, o*, on the axes of the pinions *p, p*, and so moving the rack *l*, forwards.

The blocks *j, j, j*, are prevented from rising, when pressed against the plate *h*, by the spring-clamps *q, q, q*, on the spindle *r*, which are caused to press on the blocks by the weight *s*, attached to an arm *t*, fixed on the spindle *r*. The spring-clamps are raised for the purpose of placing fresh blocks beneath them, by pulling back the handle *u*,

formed in one piece with the arm *t*, which handle is held back, until released by the workman, by a stud on its side being caught in a notch on the lever-catch *v*.

The action of the machine is as follows:—Motion being communicated to the shaft *g*, the carriage *c*, is caused to move forward, in the direction of the arrow, fig. 3; and the points of the knives *b*, entering the wood, determine the width of the splints, while the oblique cutting edge of the knife *i*, following immediately after them, cuts the splints off the face of the blocks, of the required thickness; the splints, as they are cut, pass through the space between the knife *i*, and the plate *h*, into the trough *w*.

The patentee claims, as his invention, the improved machine herein described, and more particularly the oblique position of the following knife *i*; the arrangement of the gauge knives *b*, part one way and part the other; the spring-clamps *q*, *q*, *q*; weight *s*, and handle *u*; and the raised end of the bed *k*, by which the block lies over a hollow space, and is supported only at each end.—[*Inrolled in the Inrolment Office, June, 1840.*]

To CHRISTOPHER NICKELS, of York-road, Lambeth, in the county of Surrey, manufacturer, for improvements in machinery for covering fibres, applicable to the manufacture of braid and other fabrics,—being a communication.—[Sealed 21st April, 1838.]

THE invention relates to certain improvements on braiding or plaiting machines, whereby elastic and non-elastic strands, yarns, or threads, are introduced lengthwise of the fabric, and four or more, in the same surface or plane, are produced, and not partaking of the movements of the braid-

ing or plaiting threads or yarns, which, in the progress of working, twist around or over the longitudinal introduced threads, and plait or braid amongst each other.

The objects of this invention are, first, so to arrange and adapt the mechanical parts, and the apparatus of braiding machinery, that elastic fabrics may be produced therein, with four or more strands or threads of India-rubber in the same plane, introduced as longitudinal threads; secondly, to adapt the mechanical parts and apparatus of braiding machines, that elastic fabrics may be produced therein, with four or more strands or threads of India-rubber and non-elastic threads in the same plane, introduced as longitudinal threads; and thirdly, to arrange the mechanical parts and apparatus of braiding machines, that fabrics may be produced therein, with four or more threads or strands of cotton, silk, wire, or other fibrous materials, in the same plane, introduced as longitudinal threads.

In Plate VIII., fig. 1, is a section of a revolving table or head, and of one plaiting or braiding bobbin; fig. 2, is a side view of a braiding machine, with eight revolving tables or heads, and seventeen plaiting or braiding bobbins; and fig. 3, is a plan view of the same. *a, a*, is the revolving table, which is of a like construction to those of other braiding machines, and has notches or recesses for receiving the pipes or spindles of the plaiting or braiding bobbins. This table *a*, moves on a hollow spindle *b*, which is fixed in the framing of the machine by a screw and nut, at *b*¹. Through the tube *b*, the strand or thread of India-rubber, cotton, or other suitable material, which is to form one of the longitudinal elastic or non-elastic threads of the fabric, passes. The upper part of the tube *b*, rises to such a position amongst the braiding threads, that in the evolution of these threads, from one selvage to the other of the fabric, they pass under and over each of the longitudinal threads

or yarns, and thus tie the longitudinal threads into a fabric; these forming the length of the fabric, and the braiding threads forming the covering, when worked sufficiently close. The closeness of the covering depends on the relative speed at which the work is taken up, in comparison with that at which the braiding bobbins pass from selvage to selvage of the fabric.

The axes or pipes of the braiding or plaiting bobbins are of tubes, as usual, in order to allow of means for stopping the machine, in the event of any of the threads breaking, and at the same time keeping the thread at the proper tension, at all parts of the revolving tables or heads.

The machine receives motion in the following manner:—*c*, is an endless cord or band, driven by a steam-engine or other power, which drives the pulley *d*, on the axis *c*. This axis *c*, by means of the cog-wheel *f*, taking into the cog-wheel *h*, gives motion to the axis *g*; on the upper part of the axis *g*, is a cog-wheel *i*, which takes into and drives one of the cog-wheels *j*, on the tables or revolving heads. These cog-wheels *j*, gearing one into the other, are (motion being communicated to one) all actuated and caused to revolve in opposite directions; by their revolution the pipes or spindles of the braiding bobbins are caused to pass from one revolving head to the next, the tappets *l*, *l*, acting as guides, to cause the pipes or spindles of the braiding bobbins to pass in the proper direction. *m*, is the roller for winding-up the work; it receives motion from one of the wheels *j*, which takes into and drives the wheel *n*, on a vertical axis. At the back of the machine *o*, is a wheel, affixed on the same axis as the wheel *n*, and takes into and drives the wheel *p*, on another vertical axis, at the back of the machine, there being a screw or worm affixed on the axis of the wheel *p*, which drives the roller *m*, by taking into the wheel *q*, as is shewn in the drawing.

In the event of any of the braiding threads breaking, the rod, in the hollow pipe or tube, which is the axis of that bobbin, will fall, and when it comes to the front of the machine, will come against the tail of the catch *r*, and let go the rod *s*, from the roller *t*, which will allow of the driving axis falling towards the back of the machine, and thus take its cog-wheel out of action.

This machine is capable of including eight threads or strands of India-rubber, to be worked into and covered by the plaiting of the threads from the braiding bobbins; and it should be understood, that the threads or strands of India-rubber may be uncovered or covered by any of the known means. The India-rubber threads or strands, which are to constitute the longitudinal threads, are to be wound on to bobbins or beams, but, by preference, one bobbin to each thread; and care should be taken, that the bobbins are equally weighted, in order that the threads may all be worked into the fabric with an equal strain.

One India-rubber thread is to be passed up the hollow axis of each of the revolving heads or tables, and (such is to be the case when working with longitudinal threads of silk, cotton, or other suitable fibrous materials) the plaiting or braiding threads, together with the India-rubber threads, are to be collected together, and passed over the wire guide, and thence to the roller *m*. The closeness or openness of the plaiting may be regulated as heretofore.

In case it be desirable to make a fabric with a less quantity of India-rubber threads, yet of the width the eight revolving heads or tables usually produce, a part only of the hollow axes of the tables or heads may be supplied with India-rubber threads, whilst the other hollow axes may remain empty; thus any degree of elasticity may be obtained, because the threads from the bobbins, where there are no India-rubber threads to the heads or tables,

will produce simple plaiting or braiding fabric; and again, if it be desired to control the elasticity of the fabric produced in the machine, some of the hollow axes may be supplied with India-rubber, and some with threads of cotton, silk, or other fibrous material, by which the fabric will have the elasticity of the India-rubber, and at the same time that elasticity may be prevented being drawn on beyond that distance from which it will return to its proper length; thus, with the machine above described, a good fabric may be obtained by supplying the hollow axis of the first revolving table with thread of cotton or other fibre; the second with India-rubber thread, and so on alternately.

The threads supplied to the revolving heads, whether elastic or non-elastic, must all be laid into the fabrics longitudinally, and in the same plane with each other; thus fabrics, of different strengths of elasticity, may be obtained, and also of different weight, depending on the weight of the non-elastic threads, in comparison with the India-rubber threads, which is important for surgical bands and other purposes. Or other fabrics may be made with all non-elastic threads or fibrous material, laid longitudinally in the fabric produced, such threads being wound on suitable bobbins or beams, and applied to the machine, as above described. When fabrics are plaited by this description of machinery, having India-rubber threads or strands laid in longitudinally, they are to be submitted to heat, by the application of a hot iron.

Fig. 4, is a plan view of another braiding machine, differing from that above described, inasmuch as in the former machine the bobbins, having passed from one selvage to the other, return again, but in this machine, the apparatus is so arranged, that the bobbins are constantly performing in a circle, and consequently will produce a hollow cylinder of plaited fabric, and the revolving tables or heads,

having hollow axes, may have strands or threads laid longitudinally within them. This machine differs from other braiding or plaiting machines, only inasmuch as it is capable of laying such longitudinal threads into the plaited fabric, as it is made; and if it be desired, the tube of plaited fabrics may be worked over a cord or a quantity of threads, and will then resemble a covering machine, of the ordinary kind, excepting inasmuch as it has the capability of introducing the longitudinal threads, herein explained.

The patentee makes no claim to any of the parts of the apparatus constituting the machine separately or combined, so far as the same have been before known and in use; and there may be variations made in the machine without departing from the nature of the machine, so long as the general adaptation and arrangement of the parts be as herein described. — [*Inrolled in the Inrolment Office, October, 1838.*]

To LOUIS GACHET, of Cambridge Heath, in the county of Middlesex, Gent., for his invention of improvements in machinery for manufacturing and producing velvets and certain other fabrics. — [Sealed 18th June, 1836.]

A MODE of weaving two pieces of piled fabric (such as velvet) at one operation, face to face, the warp, constituting the pile of both, being placed between the ground warps, and, by the action of the headles, carried up and down, so as to connect the two fabrics together, constituted the subject of a patent, granted to Stephen Wilson, of Streatham, in the county of Surrey, Esq., dated 7th October, 1824, (see Vol. XI., p. 129, of our First Series.) The two fabrics having been thus produced in conjunction, as Siamese

twins, required to be cut asunder, by passing a knife through the connecting threads, which separated the fabrics, and left them both with an erect pile on their surfaces.

To this mode of weaving velvets and other piled fabrics, the present invention applies, and consists in a machine, by means of which a knife-blade or lancet is made to traverse to and fro, in horizontal directions, between the two fabrics, for the purpose of cutting them asunder, as the process of weaving goes on.

There are two breast-beams in the loom, and between these the knife lies upon a horizontal frame, and it is worked to and fro by reciprocating cords, connected to the swinging lathe of a power loom.—[*Inrolled in the Inrolment Office, December, 1836.*]

To ORLANDO JONES, of the City-road, in the county of Middlesex, accountant, for improvements in treating or operating on farinaceous matters, to obtain starch and other products, and in the manufacture of starch.
—[Sealed 30th April, 1840.]

THIS invention consists in manufacturing starch from rice and other farinaceous matters, by submitting such matters to a caustic alkaline process, and also in obtaining, by that means, other products besides the starch.

In carrying out this invention, the patentee employs five sorts of vessels, viz., No. 1,—vessels of tinned iron or copper, or of stone ware, in which the rice is macerated in a caustic alkaline solution, and is washed after maceration. No. 2,—vessels of tinned iron or copper, or of stone ware, in which the rice-flour is macerated in a caustic alkaline solution. No. 3,—wooden vessels, in which the deposition

of the starch is effected. No. 4,—wooden vessels, in which the gluten and other matters, combined with the caustic alkaline solution, are precipitated. No. 5,—wooden vessels, for containing the water used for washing the rice.

The mode of manufacturing starch from rice, is as follows:—In one of the vessels, No. 1, a quantity of rice is placed, and macerated for from twenty to twenty-four hours in a caustic alkaline solution, composed of two hundred grains of caustic soda or potash to a gallon of water, and used in the proportions of fifty gallons of the solution to one hundred pounds of rice. After the rice has been sufficiently macerated, the alkaline solution is drawn off into a vessel, No. 4, and as much cold water is poured upon the rice as will be equal to double the quantity of the solution drawn off. The rice and water are then well stirred, for the purpose of washing the former, and the water is drawn off into a vessel, No. 5. The rice is removed into sieves to drain, and is after that ground into flour, which is passed through a coarse silk sieve.

The rice flour is macerated in a caustic alkaline solution, of the same strength as that before mentioned, and contained in a vessel, No. 2; to every hundred gallons of which solution one hundred pounds of rice-flour is added, and stirred gradually into it, until it is uniformly mixed; and into this mixture any deposit from the water in which the rice was washed, is put. The mixture is stirred repeatedly during the first twenty-four hours, and after that is permitted to stand, in order that the starch and other matters may be precipitated, the gluten being held in solution by the caustic alkaline liquor, which is drawn off into a vessel, No. 4, without disturbing the starch, by a tin syphon.

Upon the deposit in the vessel, No. 2, a quantity of water, equal to double the quantity of the alkaline solution

drawn off, is poured, and the whole stirred well up together, and allowed to rest for an hour, by which time the fibrous and other matters, contained in the mixture, will have settled, carrying with them a small portion of the starch, but leaving the greater portion of the starch suspended in the liquor. This liquor is drawn off by a tin syphon, and passed through fine silk sieves into a vessel, No. 3; and then a quantity of water, equal to about one-third of the starch liquor drawn off, is poured upon the remaining deposit in the vessel No. 2, and after being stirred up, and the other matters allowed to subside, the liquor containing the starch is drawn off by a syphon, in the manner just described; which process is repeated until the whole or nearly the whole of the starch is drawn off from the other matters contained in the vessel No. 2. The liquor in the vessel No. 3, is now permitted to stand for about seventy hours, so that the starch may be deposited,—and then the waste liquor is drawn off, and the starch finished in the usual manner.

To make starch of a secondary quality, the rice is macerated, washed, &c., the same as before; but instead of the starch being drawn off, (while in suspension,) by means of a syphon, from the other matters mixed with it in the vessel No. 2, the mixture is stirred up, and strained through a fine silk sieve into the vessel No. 3, and the starch is finished, as in the preceding process.

In order to make starch from wheat or other similar grain, it is ground into meal in the usual way, and mixed in a vessel, No. 2, with a caustic alkaline solution, of the same strength as before, in the proportions of fifty pounds of the meal to every hundred gallons of the solution, being stirred in gradually till the whole is uniformly mixed. The stirring is continued at intervals for twelve hours, and then the mixture is permitted to stand for seventy hours to

settle. When the starch is deposited, the caustic alkaline liquor, holding in solution the gluten, is drawn off into a vessel, No. 4, without disturbing the starch, by means of a tin syphon, and then upon the deposit in the vessel, No. 2, as much water is poured as will be necessary to pass it through the sieves, used by starch manufacturers, for separating the bran, and the liquor is run into a vessel, in order to separate the starch from the other matters, as before mentioned. After this, the operation proceeds in the same manner as when making rice starch.

In order to obtain the gluten of rice, wheat, &c., for use, as much sulphuric acid is added to the caustic alkaline liquor in the vessel, No. 4, holding in solution the gluten, as will neutralize the alkali contained in it; it is then permitted to stand for twelve hours to settle; after which the top liquor is drawn off by a syphon, the deposit mixed with the same quantity of clean water, allowed to settle, and the water drawn off as before. The deposit is then dried and ground into flour, which may be mixed with wheaten or other flour, and made into bread, &c.

The patentee claims, first, the mode of treating or operating on farinaceous matters, to obtain starch and other products, especially the flour or powder produced from rice; and also the manufacture of starch, by submitting farinaceous matters to a process or processes of caustic alkaline treatment, as herein described; and secondly, the mode of manufacturing starch from rice, by the process or processes herein described.—[*Inrolled in the Inrolment Office, October, 1840.*]

To WILLIAM THOMAS BERGER, of Upper Homerton, Hackney, in the county of Middlesex, Gent., for improvements in the manufacture of starch.—[Sealed 28th June, 1841.]

THE first improvement consists in manufacturing starch from rice, by separating the starch from the gluten of the rice, by the employment of an alkaline salt.

The salts preferred by the patentee, are the carbonates of soda and potash. The mode of employing carbonate of soda is as follows:—One hundred-weight of unground rice, perfectly free from husks, is soaked in water for two days, at the expiration of which time, the water is drawn off, and the rice reduced to the consistence of thick cream, by passing it, with water, through levigators, and straining it through a sieve, the meshes of which are about sixty to the inch. To the rice thus operated on, a solution of carbonate of soda, (consisting of seven pounds of the carbonate, dissolved in three gallons and a half of water,) is added, and the mixture stirred for half an hour, after which it is allowed to stand for fifty or sixty hours, stirring it every four hours. At the end of this time, the stirring is discontinued, and the mixture allowed to stand from twelve to eighteen hours, for the purpose of precipitating the starch and other matters, and then the top liquor, containing the gluten, is drawn off by a syphon. The starch and other remaining matters are now stirred up, and mixed with another solution of carbonate of soda, of the same strength and quantity as the first, and the mixture is permitted to remain for fifty or sixty hours, being well stirred once in every four hours; the stirring is then discontinued, and after the starch and other matters have settled, the top liquor, which contains more of the gluten, is drawn off by a syphon.

The precipitated matter is now stirred up, and brought to a thin state, by the addition of two hundred and twenty-four gallons of water, and is then pumped slowly into a long vat, divided into three or more compartments. The mixture is pumped into the first compartment, and when that is full, it flows over the partition into the second compartment, and so on, until it runs out at the farthest end of the vat; by which means, the heavy refuse particles, contained in the mixture, will be deposited in the different compartments, and the liquor containing the starch will come from the vat free from all grit and refuse matter. The refuse matter, contained in the different compartments, is now mixed with another solution of carbonate of soda, of the same strength and quantity as the first, and after standing twenty-four hours, is reduced to a thin state, by the addition of cold water, as above-mentioned, and pumped carefully through the vat.

The liquors thus obtained, containing the starch, remain in the vats or frames in which they are received as they come from the separating vat, until the starch settles, and then the waste waters are drawn off by a syphon, and the starch finished in the usual manner.

The second improvement consists in manufacturing starch from rice, by soaking the rice in water, and submitting it to fermenting processes.

Any quantity of unground rice, perfectly free from husks, is soaked in water for fourteen days, and is afterwards submitted to a process, which the patentee calls malting; this process consists in spreading the rice from six to nine inches deep, upon a clean wooden floor; and allowing it to remain, (being turned once or twice a day,) until it is soft enough to crush easily betwixt the thumb and finger. It is now reduced to a pulp, by levigating, and strained through a sieve, and then the pulp is thinned,

by the addition of two hundred and twenty-four gallons of water to every hundred-weight of rice, and is pumped through a separating vat, for the purpose of separating the refuse matter from the liquor containing the starch, as described in the first improvement. This liquor is allowed to remain in the vats or frames until the starch settles, and then the waste water is drawn off, and the starch finished in the ordinary way.

Instead of using the malting process, in combination with the soaking process, the patentee sometimes operates as follows:—The rice is soaked in water as before, remaining in it for five or six weeks, by which means the gluten is decomposed, and held in solution by its spontaneous fermentation; and at the end of that time, the thick mucilaginous matter, containing the gluten and other products, is drawn off by a tap at the bottom of the vessel. The rice is now converted into a fine pulp, by passing it through a levigating mill and sieve, which pulp is reduced to a thin state, by the addition of two hundred and twenty-four gallons of water to every hundred-weight of rice, stirring it well up; the pulp is then pumped through the separating vat, and the starch finished in the usual way.

The third improvement consists in manufacturing starch from rice, by fermentation, combined with the use of an alkaline salt.

The rice is first fermented and reduced to a pulp, by either of the processes described under the second improvement, and then an addition is made to it of a solution of an alkaline salt, (by preference carbonate of soda,) in the proportions of seven pounds of the carbonate, dissolved in three gallons and a half of water, to each hundred-weight of rice contained in the pulp. The mixture is stirred for half an hour, and is then permitted to stand for fifty or sixty hours, being stirred once in every four hours; at the

end of that time, the stirring is discontinued, and the mixture allowed to remain from twelve to eighteen hours, in order to precipitate the starch and other matters, and then the top liquor is drawn off. The remaining matter is now stirred up and thinned, by the addition of two hundred and twenty-four gallons of water to every hundred-weight of rice, and is then pumped through the separating vat, as before mentioned, and the starch finished in the usual manner.

The fourth improvement relates to blueing starch, whether made from rice or other materials, and consists in using "artificial ultramarine" for that purpose, instead of the smalts commonly employed. Previous to using this material, any acid that may be in the starch is neutralized by an alkali, the ordinary test paper being employed for the purpose of ascertaining when the acid is neutralized.

The patentee claims, first, the mode of manufacturing starch from rice, by the application of an alkaline salt, whereby the gluten and starch of rice may be separated, as described.

Secondly.—The mode of manufacturing starch from rice, by submitting grains of rice to soaking in water, and fermenting processes, as described.

Thirdly.—The mode of manufacturing starch from rice, by the combined application of an alkaline salt, and a process of fermentation, as described.

Fourthly.—The mode of colouring starch, by the application of artificial ultramarine, as described.—[*Inrolled in the Inrolment Office, December, 1841.*]

To JOHN RIDGWAY, of Cauldon-place, in the county of Stafford, china manufacturer, and GEORGE WALL, the Younger, of the same place, Gent., for certain improvements in the mode of preparing bats of earthenware and porcelain clay, and of forming or shaping them into articles of earthenware and porcelain, and in the machinery or apparatus applicable thereto.—
 —[Sealed 11th January, 1840.]

THESE improvements consist, firstly, in rolling or preparing the ordinary bats of clay, by mechanical means, instead of striking and shaping them by hand-labour, as heretofore commonly done. This is accomplished by passing the lump of clay through a pair of common squeezing rollers or cylinders, and thus causing it to assume the required form of bat, prior to being submitted to the moulds. Secondly, in a certain arrangement and construction of machinery or apparatus, for the purpose of forming or shaping articles of earthenware or porcelain clays, by means of which a "profile," used in combination with a revolving mould, is caused gradually to descend upon the mould, and form the article of manufacture, by self-acting machinery, driven by steam or other power, instead of being used by hand, as now commonly practised.

In Plate VIII., fig. 1, is a side elevation of a machine, adapted for the purpose of forming or shaping articles of earthenware or porcelain clays, by the employment of the mould and profile, which are made to operate upon the clay by mechanical means, being entirely self-acting, and capable of being driven by steam or other power; fig. 2, is a plan or horizontal view of the machine, as seen from above; and fig. 3, is an end view, as seen at the right-hand of fig. 1.

The details of the machinery, and its mode of operation, are as follow:—The upright side and cross-framing of the machinery *a, a*, support the bed or table *b, b*, which traverses to and fro upon the rollers *c, c*, placed in bearings in the side frames. This traverse of the table (being the first essential movement of the machinery) is accomplished by means of the fast driving pulley *d*, having a strap passed round it, proceeding from a steam-engine or other power, and being keyed upon the end of the driving-shaft *e*, actuating the bevelled wheel *f*, keyed upon the same shaft. The bevelled wheel *f*, gears with the pinion *g*, upon the upper extremity of the vertical shaft *h*; and near the lower extremity of this shaft, a worm *i*, drives the worm-wheel *k, k*, keyed upon the cam-shaft *l, l*, upon which the grooved cams 1, 2, 3, and 4, are also respectively keyed, each cam regulating the requisite successive operations of the machine.

The grooved cam 1, as it revolves, moves the slide-rod *m*, to the end of which is attached the radial arm *n*, vibrating upon its fulcrum *o*; the upper end of this radial arm *n*, is attached to the bed or table, and thus, as the cam 1, revolves, the requisite reciprocating traverse of the table is effected. The formation of the cams 1, 2, and 4, are more clearly shewn in the attached views, figs. 4, 5, and 6.

Now, supposing an ordinary mould, for forming the interior of any round vessel or article of manufacture, to be placed upon the feeding-table *b, b*, about the place shewn by (*) in the figures 1 and 2, and so that the centre of its base shall be over the centre of the aperture cut in the table, and also shewn at (*), and a rolled bat of clay placed upon it, by a proper tool for the purpose; then, as the cam 1, revolves, and the table traverses in the direction of the arrow, it will convey the mould to the spring folding doors of the "slurry-box" *p*, and as soon as the mould is,

by the action of the table, pressed against them they will open, and the mould will be conveyed by the table until it arrives exactly over the vertical spindle *q, q*, the spring doors having closed, leaving the mould within the slurry-box. The cam 2, now comes into operation, as it revolves with the cam-shaft, and the excentric groove, formed on its face, slides the bar *r*, which has the inclined plane *s*, formed upon its extremity, which immediately lifts the foot-step or bearing of the spindle *q*, and forces the spindle upwards into the mould (*,) just brought over it, and lifts the mould from the table.

Immediately the cams 1, and 2, have thus caused the mould and spindle to assume these positions, the excentric cam 3, having a grooved periphery, traverses the strap-guide *t*, and with it the cross-shaft *u*, (which has been running upon the loose pulley *v*,) on to the fast pulley *w*, keyed upon the cross-shaft *x, x*. About the middle of this shaft the mitre-wheel *y*, gears into the mitre-wheel *z*, upon the upright shaft 5, upon which a band-pulley 6, and band 7, driving the band-pulley 8, upon the spindle *q*, causes the spindle, and with it the mould and bat of clay, to revolve rapidly. Water, contained in the tank 9, above, is now caused to flow upon the clay, in order to mollify it, by means of the groove 10, cut in the side of the table *b*, drawing down the pinion and rack-rod 12, and thus opening the cock 11.

The above evolutions of the machinery having brought the mould into the slurry-box, and caused it to revolve, and the bat of clay being brought into a proper state to receive its outer shape or form, the cam 4, now comes into operation,—which, as it revolves with the cam-shaft, brings down the profile 13, having its fulcrum in the upright 14, by means of actuating the connecting-rod 15, working in the swivel bearing 16.

It will thus be perfectly evident, that as the profile descends and passes upon the revolving clay and mould, that its outer form or shape will be instantly completed, and ready to be removed to receive the operations of finishing. This is immediately accomplished by the peculiar arrangement and construction of the cams, which can be easily calculated by the practical engineer; and at this position of the apparatus the profile 13, will ascend, by means of the revolving cam 4, thus releasing the now formed article from pressure. The spindle *g*, will cease to revolve, by means of the revolving cam 3, having passed the strap *n*, upon the loose pulley *v*, and will drop down out of the mould, by means of the revolving cam 2, having brought the top of the inclined plane *s*, from under the foot of the spindle; the water-tap closed, and the feeding table again put in motion, by means of the revolving-cam 1.

The cams 1, 2, 3, and 4, having completed one entire revolution, and each having performed its respective operation, the mould, with its now formed article upon it, only remains to be entirely removed from the slurry-box, in order to make room for the next mould and bat to enter.

This last operation is accomplished by means of a pin or stud 17, on the back of the cam 1, vibrating the bell-crank lever 18, which works upon the fulcrum 19, and has, at its other arm, a connecting link 20, which is connected to a short projecting piece, formed upon the detent-rod 21, 21, supported in the bearings 22, 22, and furnished, at suitable intervals, with hooked arms or detents 23, 23.

Now, it will be seen, that as the table *b*, moves forward, the mould, with the formed article, will be conveyed out of the slurry-box through the spring folding doors, on the opposite side, which will, like the former, spring back and close after it, as soon as the mould has passed through; and the detent rod 21, being pulled round one quarter of a

revolution, by means of the vibration of the bell-crank lever, will allow the mould to pass under the detents, and proceed forward with the table.

The pin 17, then escaping the end of the bell-crank lever, the detent rod will fall to its former position, and the hook or detent will prevent the mould being carried backwards by the return of the feeding-table. The next evolution takes the finished article and mould another step, and so on until after it has passed the last detent, which will thus convey the mould into the hands of the finishing operator.

The patentee claims, firstly, rolling or preparing the ordinary bats of clay, by passing them through rollers or cylinders, instead of forming them by hand, as now commonly done in the potteries; and secondly, the arrangement and construction of machinery or apparatus, for the purpose of shaping or forming articles of earthenware or porcelain clays, by means of a "profile," used in combination with a revolving mould, or vice versa; and also in combination with self-acting feeding and delivering apparatus, impelled or driven by steam or other power.—[*Inrolled at the Rolls Chapel Office, July, 1840.*]

Specification drawn by Messrs. Newton and Berry.

To SAMUEL SALISBURY EAGLES, of Liverpool, in the county of Lancaster, engineer, for certain improvements in obtaining motive power.—[Sealed 2nd June, 1840.]

THESE improvements in obtaining motive power consist in a certain construction and arrangement of machinery, applicable to propelling vessels afloat on seas, rivers, and canals; a part of which machinery is also applicable to propelling carriages on railways, and on common roads, and also for driving machinery in general.

The particular features of the invention may be considered as divisible into two distinct heads: First, a mode of propelling vessels on water, by means of reciprocating pistons, acting in open horizontal cylinders placed in the stern of the vessel, below the surface of the water, such pistons being actuated by atmospheric steam-engines, working horizontally, and at every stroke forcing back the volume of water out of its cylinder, in order that, by the resistance of the water, the vessel shall be impelled in the opposite direction; and secondly, a mode of communicating the impelling power, exerted by the reciprocating action of a pair of atmospheric steam-engines to a rotary shaft, without the intervention of cranks.

In Plate VIII., fig. 1, represents the improved machinery, in horizontal section, supposed to be constructed in a ship or other vessel. *a, b*, are steam cylinders, open at one end to the atmosphere; *c, d*, are pistons, properly packed, so as to fit steam-tight within the cylinders, from which pistons, rods *e, f*, extend; and at their reverse ends are connected to other pistons *g, h*, working water-tight in cylinders *i, k*, which last mentioned cylinders are open at both ends, their inner ends to the atmosphere, their outer ends to the water. This horizontal section is taken below the level of the water, in which the vessel is supposed to be floating.

On the inner edges of the piston rods *e, f*, racks are formed, which take into a toothed horizontal wheel *l*, for the purpose of assisting the reciprocating action of the pistons; that is, when one of the piston rods is moving forward, the racks and toothed wheel may facilitate the retrograde movement of the other piston rod, and vice versa.

Steam, by any of the ordinary means, is to be let into the cylinder *a*, behind the piston *c*, the expansive force of which, will project the piston *c*, towards the open end of

the cylinder. When that has taken place, the induction valve of the cylinder will be shut by the ordinary means, and the eduction valve opened, by which the steam is drawn off, leaving the interior of the cylinder *a*, behind the piston, in a state of partial vacuum. The pressure of the atmosphere through the open end of the cylinder, then acting against the face of the piston, will force it back again towards the closed end of the cylinder, and on a fresh supply of steam being inducted behind the piston, the piston will be projected forward as before. This is the ordinary operation of an atmospheric steam-engine; and when two cylinders are employed in conjunction, as in the present instance, the opening of the induction valve in one, will cause the eduction of the other to be closed, and hence, the piston *c*, and *d*, in the two cylinders *a*, and *b*, will be made to move to and fro reciprocally.

The mouths or outer ends of the other cylinders *i*, and *k*, being open, the water will flow freely into them, and occupy the interiors of those cylinders up to the faces of the pistons *g*, and *h*; but when, by the reciprocating action of the pistons *c*, and *d*, produced as above described, the rods *e*, and *f*, are moved forward, the piston *g*, or *h*, will be projected outward, and displace the volume of water from the cylinder. In this way, by the resistance of the water against the face of each piston, a force will be obtained which will impel the vessel in an opposite direction.

The horizontal wheel *l*, is mounted loosely upon a vertical axle, and enabled to turn freely, so that as the piston rod *e*, moves in one direction, its teeth taking into the wheel *l*, will cause that wheel to revolve, and to drive the rod *f*, in the opposite direction, so that the advance of the steam piston *c*, its rod *e*, and the propelling piston *g*, will aid the retrograde movement of the steam piston *d*, and its rod *f*, and propelling piston *h*.

In applying a part of this machinery to the propelling of carriages on railways, and on common roads, or for the driving of machinery in general, the arrangement shewn in the horizontal view, fig. 1, is adopted, with the exception of the pistons *g*, and *h*, and the cylinder *i*, and *k*, and the addition of a pair of toothed sectors, working vertically, mounted upon a horizontal shaft, through which the impelling power is to be communicated, for driving the running wheels of a carriage, or the main driving wheel of any other kind of machinery.

This modification of the invention will be further illustrated by the sectional elevation at fig. 2;—one of the two steam cylinders, as above described, is shewn at *b*, and its position at *d*. The shafts *e*, and *f*, in this modification, have racks or teeth formed on their upper surface, as well as upon their inner edges; and the two vertical segment racks *m*, and *o*, both take into these racks on the faces of the piston rods, and work loosely upon a horizontal axle or shaft *n*, which shaft turns freely in plummer blocks upon standards *p*, fixed at the sides of the machinery.

The reciprocating action of the steam piston *c*, and *d*, and their rods *e*, and *f*, as before described, give a reciprocating rotary motion to the wheel *l*, and this reciprocating rotary motion of the wheel *l*, through the teeth upon its face, actuates the two segment racks *m*, and *o*, causing them to oscillate as the steam pistons move to and fro.

To each of the segment racks, a spring click *r*, is attached, which takes into a ratchet *s*, affixed to the horizontal shaft *n*. Hence, it will be perceived, that as the segment rack moves in one direction, the click will take hold of the ratchet, and drive the shaft round with it; but as it moves in the opposite direction, the spring click will slide over the ratchet, without acting upon the shaft. As the two segment racks move simultaneously, in opposite directions,

one of the clicks is inoperative upon its ratchet; but the other click is then driving the other ratchet, and with it the shaft *n*. It will now be seen, that by the reciprocating movements given to the steam pistons *c, d*, their rods *e, f*, and the wheel *l*, will be actuated, and cause the segment racks *m*, and *o*, and their clicks *r, r*, to act upon the ratchet, and give such movements as will produce, in the shaft *n*, a continuous rotary motion, which rotary motion may be communicated to the running wheels of locomotive carriages, or be applied to the actuating of other machinery.—[*Inrolled in the Petty Bag Office, December, 1840.*]

Specification drawn by Messrs. Newton and Berry.

To PETER FAIRBAIRN, of Leeds, in the county of York, engineer, and WILLIAM SUTTILL, of the town of Newcastle-upon-Tyne, flax spinner, for certain improvements in drawing flax, hemp, wool, silk, and other fibrous substances.—[Sealed 26th January, 1841.]

THESE improvements in drawing flax, hemp, wool, silk, and other fibrous substances, consist in certain novel constructions and arrangements of the parts of a machine for preparing these fibrous materials, and bringing them into the state of sliver, ready for the further process of drawing and roving; by means of which improved machinery, the long fibres of the material are broken into shorter lengths, and the short fibres drawn straight, so as to produce nearly an equality in the staple or lengths of the fibres throughout the sliver; and at the same time the tow, floss silk, noils of wool, or other loose short fibres in the ends of each several strick or hand-full of the material, is drawn out of

the strick, and retained in the pins of lateral bands of heckles.

Fig. 1, Plate IX., represents a longitudinal section, taken through about the middle of the machine. A transverse sectional elevation is represented in fig. 2, and an horizontal view at fig. 3; the superincumbent rollers being, in this last-mentioned figure, removed, to shew the working parts below.

Four barrels or wheels *a, a, a, a*, with double flanges, are fixed upon horizontal shafts *b, b*, which are made to revolve in suitable bearings in the standard frames. These barrels carry two endless bands of leather *c, c, c, c*, which have longitudinal rows of pins inserted in them, like heckle points. Between these two endless bands, a series of transverse heckle-bars *d, d, d*, working upon the principle of what is called the "screw gill," travel a certain distance along the middle of the machine, conducted in the ordinary way by rotary screws or worm-shafts *e, e*.

A strick of flax, or other fibrous material, to be operated upon, is placed transversely across the machine, as shewn at *f, f*, in the horizontal view, fig. 3; the portions, near its ends, being inserted between the pins of the endless bands *c, c*.

Narrow rollers *g, g, g*, fixed upon a shaft *h*, which turns loosely in forks, standing up from the side frames, (see fig. 1,) bear upon the ends of the fibres of the strick, and by their weight press them down upon the endless bands *c, c*, between the pins, for the purpose of keeping the fibres tightly held and distended by the pins.

The fibres in the middle of the strick are then to be conducted forward between two conductors *i, i*, to the rollers *j, k*, which are feeding rollers, leading the fibres to the heckle-points, set in the bars *d, d*, of the gill; and these heckle-bars, moving onward at a speed about equal to

the rotary motion of the feeding-rollers *j, k*, which is nearly ten times faster than that of the lateral bands and pins *c, c*, cause the fibres of the material, taken hold of about the middle of their lengths by the points of the gill, to be drawn out from the pins of the lateral bands,—leaving the tow, floss silk, noils of wool, or other short fibres, retained between those pins, whilst the clean fibres are carried forward, by the gill heckle-bars, to the drawing rollers *l, m*.

These drawing rollers *l, m*, revolve above twenty times faster than the gill heckle-bars travel, which necessarily cause the short fibres of the material to be drawn out from the pins of the gill, and thereby to become straightened; whilst the longer fibres, being held between the pins of the gill, are, by the draft of the rollers *l, m*, broken into lengths nearly equal to the ratch-reach, or distance between the bite of the drawing rollers and the retaining points of the gill.

The fibres, thus operated upon, assume the form or state of sliver, on passing the drawing rollers, which sliver is thence conducted through a trumpet *n*, and between the delivering rollers *o, p*, into a can or other receptacle below, for the purpose of being taken to other machinery, where it undergoes the second and third processes of drawing and refining.

The driving power, by which this machine is to be actuated, is applied through a pulley or band, and rigger, to the shaft of the lower drawing roller *l*, which roller *l*, should be made to revolve with a speed of about one hundred and twenty revolutions per minute.

The upper drawing roller *m*, turns upon its axis, merely by the friction of contact between it and the periphery of the lower roller *l*; and, in order to produce a powerful pressure or bite between the drawing rollers, the upper one is held down by weighted levers *q, q*, which bear upon the

ends of its axle. By these means, the drawing rollers *l*, and *m*, are actuated, and made to bring the fibrous material through the machine.

Upon the front end of the shaft of the lower drawing roller *l*, there are affixed two pinions *r*, and *s*, taking into carrier wheels, which communicate the driving power to the other parts of the machinery.

The pinion *r*, gears into the first of a train of carrier wheels and pinions 1, 2, 3, on the front side of the machine; and at the reverse end of the shaft of the pinion 3, there is affixed a smaller pinion 4, (see the horizontal view, fig. 3.) This pinion 4, drives a wheel 5, upon the axle of which, there is another pinion 6, gearing into a wheel 7, that gives motion to the wheel 8, fixed on the shaft of the lower feeding roller. Hence, by this train of wheels and pinions, the roller *i*, is made to turn with a speed of about one twentieth that of the drawing rollers *l*, *m*.

The axle of the upper feeding roller *k*, turns loosely in forks at the sides of the standard frame, and is pressed down upon the lower roller *i*, by hanging straps and weighted levers *t*, *t*, the upper roller turning by the friction of its contact with the lower one.

Upon the shaft *n*, of the pinion 3, 4, above described, there are also two bevil pinions *v*, *v*, affixed, which take into similar bevil pinions on the ends of the lower screw or worm shafts *e*, *e*, by which the heckle-bars *d*, *d*, *d*, of the gill are worked.

The operation of the screw gill, as a piece of mechanism, is so well known to flax spinners, that it is not necessary particularly to describe its actions, and the drawings fully exhibit the manner of its adaptation to this improved machine. It will therefore be sufficient here to say, that, by the rotation of the worm shafts *e*, *e*, driven by the means described, the bars *d*, *d*, *d*, with the heckle joints, are suc-

cessively brought up into operation through the fibres of the material, and conducted along the range of the worms or screw-shafts *e, e*, carrying the material with them in the way above explained and that the middle parts of the fibres are taken from the descending heckle bar, by the driving rollers, which draw them out of the pins, and by equalizing the lengths of the fibres, as described, deliver the material, in the state of sliver, into a can below. It remains only to say, that the slow progressive movement of the endless band and points *c, c*, by which the tow, floss, or noils, at the ends of the stricks, are retained, is effected by the connection of a train of wheels, actuated by the wheel 8, on the end of the shaft of the lower feeding roller *i*.

This wheel 8, takes into a wheel 9, turning upon a stud fixed in the back frame of the machine, which wheel has a pinion on its boss, taking into a pinion 10; and another pinion 11, driven by the last, taking into the wheel 12, fixed on the end of the barrel shaft *b*, gives the very slow motion to the endless bands, of about one-tenth that of the feeding roller *j*.

The pinion *s*, on the main shaft *l*, takes into a wheel 13, turning upon a stud fixed in the standard frame, and this wheel 13, drives a pinion 14, on the shaft of the lower delivering roller *o*, by means of which, the sliver is conducted from the trumpet and passed down to the can below.

As the surface of the upper drawing roller *m*, requires to be kept clean from tow or any short fibres which may attach themselves to it, a roller *w*, covered with cloth or felt, is fixed upon a short axle, which has its bearings in two arms, swinging upon a transverse shaft *v*, mounted at the upper parts of two standards *x, x*, as shewn by dots in fig. 2. The weight of this roller *w*, keeps it down in contact with the periphery of the roller *m*, and it is made to

revolve by a pinion 18, upon its axle, gearing into a similar pinion 17, fixed upon the axle of a wheel 16.

The pinion *s*, on the main driving shaft, takes into a carrier wheel, which is in gear with the wheel 16, and hence, the rotation of the main shaft *l*, gives the required rotary motion to the roller *w*.

As the fibres of different qualities of flax, and other materials, vary considerably in length, it is necessary to provide the means of increasing and diminishing the reach, or distance between the bite of the drawing rollers *l, m*, and the holding heckles of the gill *d, d*. For this purpose, therefore, the front part of the machine is so constructed as to allow of its sliding in and out, horizontally, upon the main standard frames; that is, the drawing rollers *l, m*, the front barrels *a, a*, and the delivering rollers *o, p*, with their appendages, are mounted in an adjustable frame *y, y, y, y*, which is capable of being slidden forward or backward upon the standard, and when placed at its proper distance, is made fast by screws.

In shifting the position of the drawing rollers, by sliding the frame *y, y*, with the front parts of the machinery, forward or backward, as described, it will be necessary to provide means by which the endless bands *c, c*, may be made to accommodate themselves to those adjustments. For this purpose, therefore, the ends of the axle *b*, of the back barrels *a, a*, are mounted in sliding bearings, which are adjustable by screws, taking into sockets at the back end of the machine, as shewn in the figures; and by means of these screws, the back barrels *a, a*, may be shifted forward or backward as the positions of the front parts of the machine may require.

The patentees claim, as the main feature of their invention, an arrangement of such known agents as will afford means, by which the fibres of flax, hemp, wool, silk,

or other fibrous material, placed transversely in the machine, may be drawn from the middle of the strick, instead of endwise, as heretofore, for the purpose of breaking the long fibres to nearly an equality of length with the short fibres, and thereby drawing them into a sliver of nearly uniform staple. Also the adaptation of lateral heckle points, by which the ends of the stricks may be held, and the tow, floss silk, noils of wool, or other loose and short fibres, drawn out of the ends of the stricks by the greater speed of the feeding rollers and travelling gill-heckles."—[*Inrolled in the Petty Bag Office, July, 1841.*]

Specification drawn by Messrs. Newton and Berry.

To MILES BERRY, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, patent agent and civil engineer, for an invention of certain improvements in machinery or apparatus for making or manufacturing nails and brads,—being a communication.—[Sealed 4th May, 1841.]

THIS invention of certain improvements in machinery or apparatus for making or manufacturing nails and brads, consists, in the first place, in the peculiar arrangements and combinations of machinery for manufacturing such articles; and secondly, in the formation or shaping of the cutting tools for cut-nail machinery, so that the angle of the shoulder and head on one side of the one nail, shall form the point of the next nail, and so on.

In Plate IX., fig. 1, is a horizontal view of the improved arrangement of cut-nail machinery; fig. 2, is a longitudinal section, taken vertically through the middle; and fig. 3, a transverse section, taken vertically also through the middle of fig. 1.

The frame-work which supports the operative parts of the machine is shewn at *a, a, a*; *—b, b*, are the fast and loose pullies, by which motion is communicated; *c, c*, are two levers or beams, turning upon centres at *d, d*; the upper one is connected to the lower by the link *e, e*, and the latter to the crank *f*, by the connecting rod *g*, by which means a reciprocating motion is communicated to those levers.

The manner in which the levers are mounted, will be best seen in fig. 3. They turn upon centre pins *h, h*, passed through holes formed in the frame-work of the machine. Upon their outer ends there are circular grooves *i, i*, in which the collars *k, k*, formed on the heads of the screws *l, l*, work; these screw-heads are also provided with circular grooves *m, m*, to receive the collars *n, n*, formed upon the centre pins *h, h*; by which it will be evident, that on turning the screws *l, l*, backwards or forwards, the centre pins will advance upon or recede from the reciprocating levers *c, c*.

The tools or cutters, by which the strip of metal is separated, in order to form nails or brads, are shewn at *o, o*; they are mounted upon the levers *c, c*, and partake of the reciprocating motion given thereto. The means by which they are adjusted and held in their correct positions, will be best seen in the section fig. 2.

Within the flanges of the levers *c, c*, are formed slots or grooves *p, p*, into which are passed the cross-pieces *q, q*, which are provided with tightening screws, pressing upon the cutters *o, o*, as shewn in the drawing. At *r, r*, are other cross-pieces, also mounted in slots, formed in the levers *c, c*, and furnished with set-screws, acting against the ends of the tools or cutters, by which means they are pressed forward against the stop-pieces *s, s*, formed on the inside of the levers *c, c*.

There are guards *t, t*, for the purpose of preventing the cut-nail from getting between the levers *c, c*; and at *u, u*, are wedge-formed pieces, placed between the tools or cutters and the levers *c, c*, which are capable of being drawn forwards or backwards, by the screws *v, v*, for the purpose of raising or depressing the cutters *o, o*.—*x, x*, are set-screws, for adjusting the cutters in a transverse direction.

On motion being communicated to the crank *f*, the levers *c, c*, will, as before stated, receive a reciprocating motion, turning upon their centres at *d, d*, by which means a top and bottom tool or cutter, situated on opposite sides of their centres, will meet or slightly pass each other at every revolution of the machine.—For, supposing the crank to revolve, and consequently the levers to vibrate in the direction of the arrows fig. 2, the upward motion thereof will cause the tools or cutters *o¹, o²*, to approach each other, and cut or separate the strip of metal *w*, as shewn in the detached figure 5; but on the opposite or downward motion of the crank, the levers turning in the direction of the dotted arrows, will bring the tools or cutters *o³, o⁴*, into operation, as shewn in the detached figure 6, and so on, each pair of cutters coming alternately into action at each half revolution of the crank *f*. The strip of metal *w, w*, intended to be cut into brads or nails, may be introduced hot or cold, either by hand or other convenient means; but the mode preferred is shewn in figs. 2 and 3, in which figures 1, 1, is a strong beam of wood, resting upon the frame-work of the machine, and secured, at its upper end, to the upper part of the building. To this beam is secured, by means of brackets 2, 2, the trough or casing 3, 3, which constitutes a channel for the passage of the strip of metal to be cut into nails or brads. In this channel or trough, a bar or rod 4, passes, the lower end of which has a projecting piece or foot 5, (see fig. 2,) its upper end passing

through geared friction rollers 6, 6*, as shewn by dots in fig. 3.

On the axle of the roller 6*, is mounted the worm-wheel 7, taking into the worm 8, upon the short shaft 9, which shaft has rotatory motion communicated to it by means of the pulley 10, driven by a band from another pulley 11, upon the main shaft of the machine; by which means, the rod 4, is caused to descend with a gradual uniform motion.

The roller 6, turns upon an axle, mounted in a box 12, which vibrates upon a centre at 13. To the under part of the box 12, is connected the tail-lever 14, which is operated upon by the cam 15, upon the upright shaft 16, by which means the roller 6, is held firmly against the rod 4; but on turning the shaft 16, round a portion of a revolution, the tail-lever 14, will fall on to the lower portion of the cam 15, and allow the rod 4, freely to ascend.

An arm or brace 17, connects the rod 4, with a sliding piece 18, which sliding piece moves freely up and down on a dove-tailed rib 19, affixed to the standard 1, 1. The strip of metal to be operated upon, is first formed by turning the edge up at one end into the shape represented at fig. 7, and is then placed under the foot of the rod 4, as shewn in fig. 2, the spring-hook 29, holding it securely in that position. The lower end passes through guides 20, 20, and a spring-catch 21, acting against its edge, presses it firmly against the side of the trough 3, (see fig. 4,) which is a view of that lower portion of the feeding apparatus removed from fig. 3.

The strip of metal having been operated upon nearly throughout its length, (that is, nearly the whole cut into nails,) a stop-piece, affixed to the sliding plate 18, comes in contact with the collar 22, when the attendant turns the handle 23, mounted upon the upright shaft 16, and thereby brings the lower portion of the cam 15, under the tail-piece

14, by which means the rod 4, will be liberated from the pressure of the roller 6, and may be moved upwards by the handle 23, (which slides loosely upon the shaft 16,) ready to receive another length of metal, to be operated upon in like manner,—the counter-balance weight 30, attached by a cord to the sliding piece 18, assisting this operation.

As the rod 4, 4, passes upwards, to receive a fresh supply of sheet metal, the waste, or that portion which has remained uncut, comes in contact with two projecting inclined planes 24, affixed to the trough 3, as shewn in fig. 2*, by which means it is disengaged from the spring-catch 19, and is forced through the opening 25, from whence it is conveyed by guides, in any convenient manner, to a receptacle placed to receive it.

It will be perceived, by inspecting the drawings, that the rod 4, consists of two pieces, sliding against each other at 26, and that between these two pieces is placed a spring 27, for the purpose of allowing the strip of metal to be stationary at the moment a nail or brad is being cut therefrom; which, as they fall, are guided by the plates 28, 28, and pass through the opening 29, into a basket or other receptacle, placed below to receive them.

The machinery or apparatus above described, for cutting nails and brads, may be provided with cutting dies or tools, suitably formed, for producing nails or brads of a wedge-shape, without heads, as are commonly made; and also other forms of nails or brads; or it may be provided with the peculiarly-formed cutters, which constitute the second head of this invention.—

This consists, as before stated, in so forming the cutting tools of cut-nail machinery, that the head of one nail shall be formed by two projections, cut from the points of the two adjoining nails. For instance,—should it be desired to produce, in the improved machinery, the shape of nail

shewn at fig. 8, one pair of dies, say o^1, o^2 , are formed, as shewn in the section, fig. 9, which, operating upon the strip of metal passed between them, will cut the strip into the form shewn at fig. 10; and when the next pair of cutters o^3, o^4 , of the form shewn in fig. 11, come into operation upon the metal, as shewn by dots in fig. 10, they will cut off the nail, as described.

Fig. 12, is a portion of the strip of metal, with the lines of division on it, shewing how a succession of nails are cut therefrom. Instead of the peculiar form of nail, shewn at fig. 8, the sides of the nail may be made straight, until they approach the point, as represented at fig. 13; or if desirable, the heads and points may be rectangular, as at fig. 14, or of many other forms, without departing from the principle of the peculiar construction of dies, as above explained.

The patentee claims, firstly, the improved arrangement and construction of machinery for cutting nails and brads, consisting of two opposite pairs of cutters, having a reciprocating motion, as above described; and secondly, so shaping the cutting dies or tools of cut-nail machines, as to enable them to produce nails or brads, having heads formed by two projections cut from the ends or points of the two adjoining nails.—[*Inrolled in the Petty Bag Office, November, 1841.*]

Specification drawn by Messrs. Newton and Berry.

To ALPHONSE RENÉ LE MIRE DE NORMANDY, of Red-cross-square, Cripplegate, Doctor of Medicine, for certain improvements in the manufacture of soap.—
[Sealed 8th September, 1841.]

THIS invention is for the purpose of rendering soap cheaper, and making it of such a consistency as may be required;

it consists in introducing into soap, manufactured in the usual way, the salts of potash or soda, generally, but more particularly the sulphates and carbonates of potash and soda. These substances are introduced into the soap (when the saponifying process is complete, and it is ready to be cleansed) either in the solid state, in pulverized masses, in the state of crystals, or in the state of crystals melted in their water of crystallization, or else dissolved in steam or water.

The quantities of the salts of potash or soda used to every eighty pounds of soap, are twenty-eight pounds of sulphate of soda, and four pounds of carbonate of soda or potash, or two pounds of each of these last substances; if the substances are used singly, then the quantities are thirty-two pounds of sulphate of soda, or fifteen pounds of sulphate or carbonate of potash, or ten pounds of carbonate of soda.

When the process of saponification is complete, and the soap in a hot and liquid state, is turned over into the cleansing copper, the salts, in the proportions above mentioned, are thrown into it, and the whole thoroughly mixed together; the soap is then removed from the copper and poured into the frames to cool.

If the salts are used in a liquid state, they are dissolved in their own water of crystallization, or in steam, or by boiling water, and are then mixed with the soap, as before mentioned.

The patentee claims the introducing into soap, already manufactured, or in process of manufacture, the salts and compounds of potash and soda, hereinbefore mentioned.—
[Inrolled in the Inrolment Office, March, 1842.]

Original Communication.

OBSERVATIONS ON CHEMICAL COMBINATION;

BY ANDREW URE, M. D., F. R. S., &C., PROFESSOR OF CHEMISTRY,
AND ANALYTICAL CHEMIST.

THAT species of chemical affinity, which has been called predisposing, seems to be of too metaphysical a nature to admit of an intelligible explanation. The following example will illustrate my meaning:—

When a piece of zinc or iron is immersed in water, freed from air by being placed under the receiver of an air pump, or by prolonged ebullition, the metal suffers no change, because, it is said, the affinity of the oxygen for the hydrogen of the water, is greater than the affinity of the oxygen for the metal. But if, now, a little sulphuric acid be added to the water, the play of the affinities is changed. The acid has a powerful attraction for the metal in combination with oxygen, (as an oxide,) and this active affinity, joined to the previous dormant affinity of the metal, for oxygen, constitute, together, a divellent force, which overcomes the quiescent affinity between the oxygen and the hydrogen, which the metal could not accomplish by itself. The hydrogen is therefore left without a partner, and is disengaged in the gaseous form, while sulphated oxide of iron or zinc remains dissolved in the water.

Such is the explanation which has been given by Berthollet, Berzelius, and other distinguished chemical philosophers, of what is rather metaphorically termed predisposing affinity; they conceive a substance (the metallic oxide) to be efficient or operative as a cause of change, before that substance has come into existence. They thus seem to endow brute matter with intellectual foresight, and represent it acting as if animated by predisposing wishes to bring about a new arrangement of chemical matrimony. Here is certainly no just explanation of the physical phenomena.

It has been long observed, but never till lately deliberately investigated, that a certain class of feeble combinations, placed in corpuscular contact, or even merely in presence of each other, (*justaposition*,) become decomposed or transformed into totally different compounds, without the exciting body entering into any of the new products, or giving up any of its constituent principles to them.

Berzelius, who first attempted to explain this curious phenomenon, accounts for it rather by the invention of a name than by an inductive reason. He assigns its origin to a new and peculiar chemical power, which he calls the *catalytic*, or *catalysis*, dissolution or disintegration. He compares its agency to that of organization, in preparing the principles necessary for the existence of the animal body, such as the blood, the bile, &c., out of the aliments. Of this phenomenon we have examples in sugar, when placed in contact with a ferment and water, being decomposed within itself into carbonic acid and alcohol; in amygdaline, when placed in contact with emulsine, (two principles of bitter almond,) into prussic acid and essential oil of almonds; in the deutoxide of hydrogen, when in contact with a particle of peroxide of manganese, being decomposed into oxygen and water; as also in boiling syrup, so thick as to form crusty bubbles, becoming as thin as water, by the addition of only one-thousandth part of oxalic acid, while the sugar loses its crystallizing power.

The most striking circumstance in the decomposition of oxygenated water, and which places it beyond the pale of ordinary chemical phenomena, is the simultaneous reduction of certain metallic oxides, in contact with it, at the moment when it gives out one half of its oxygen. This happens not only to the oxide of silver, but to the peroxide of lead, and other oxides which retain the whole or certain proportions of their oxygen with a feeble force; while certain oxides, which retain their oxygen obstinately, simply decompose the oxygenated water by contact, without suffering any change themselves: the oxide of silver, at the instant of the water giving off the half of its oxygen, is reduced to the metallic state by the disengagement; but in like

circumstances, the peroxide of lead parts with only one-half of its oxygen.

Liebig rejects the term of catalysis, with its pretended explanation, and ascribes the above and similar phenomena to the power which bodies, in a peculiar molecular state of repose or commotion, have to impart, by contact alone, the same state to certain other bodies, whereby intestine changes ensue in the form and composition. Thus, in the case of many saline solutions, saturated in the hot state and carefully cooled, the force of cohesion remains in abeyance or suspended, till the slightest tremor be given to the liquid, or till a grain of sand or crystalline particle be brought into contact with its surface, when, from that point as a centre, rays of crystals shoot out in all directions, and the liquid is speedily solidified with the evolution of caloric. Water, cooled below the freezing point in narrow-mouthed vessels, exhibits the same phenomena. Thus also, if a dilute solution of a salt of potassa, nitre for example, be mixed with a solution of tartaric acid, and left to repose, it affords no sign of change; but whenever the mixture is agitated, the liquid becomes immediately turbid, and lets fall a crystalline precipitate of cream of tartar. The solution of a magnesian salt, which remains unclouded after the addition of phosphate of ammonia, deposits the double phosphate of magnesia and ammonia, at every point of the vessel rubbed with a glass rod.

The new law assigned by Liebig to govern these phenomena, may be thus stated :—Every body which is in a state of decomposition, or in other words, every body, the equilibrium of whose elements is disturbed, whose molecules are therefore in a state of commotion, is able to impart a like state of commotion to another compound in contact, whereby chemical unions and disunions result, and in which the elements are grouped in new directions, according to their peculiar attractions. In a compound liable to this intestine change, by the infection as it were of another changing body, the elements must necessarily be associated by a feeble force of affinity. The substance *inductive* of these decompositions, does not act by virtue of its peculiar

chemical nature, (*Liebig*,) but simply because it is the *primum mobile*, or first spring of an action, which extends beyond the sphere of its own decomposition.

The derangement of equilibrium may be caused, not only by contact with a foreign body in a quiescent state, and by the influence of a body actually undergoing metamorphosis, but also by heat. A combustible body, placed in contact with another burning body, enters into combustion, though it would not by itself burn in air, even when heated to the same temperature. Thus also platinum, when alloyed with silver, dissolves in nitric acid, though it would not do so by itself. Nitrogen alone cannot, by means of heat, be combined with oxygen, so as to form nitric acid; but when it is mixed with hydrogen, it may then be burned in oxygen or the atmospheric air, with the production of aquafortis.

Berzelius has endeavoured to show that some fallacy exists in these instances adduced by *Liebig*, in proof and illustration of his new doctrine of inductive chemical action. Platinum dissolves indeed in nitric acid, when associated with silver, but not when alloyed with iron, zinc, copper, or mercury. Some other cause must therefore be assigned for the first phenomenon. The peroxide of manganese does not give up its second proportion of oxygen to oxygenated water, though this is loosely combined, while that of silver, parts with the whole of its oxygen in the same circumstance.

Finally, the transformation of nitrogen into nitric acid, through the intervention of hydrogen, is determined by the possibility of thereby forming the hydrated acid; and the elements of nitric acid cannot exist in union without a base, such as water or a metal. What is called nitric ether, contains nitrous acid, which can exist without water.

The above examples cannot be held sufficient to demonstrate that a body, when in a certain state of chemical activity, will impart a like chemical activity to another body, which would have otherwise persisted in its inactive state, either in virtue of the affinity or inertia of its molecules. But, certainly, other pheno-

mena, such as fermentation, eremacausis, and dry-rot, render the existence of that force more than probable. If this action, due to contact, be called the *metastatic* force, the opinions of Berzelius and Liebig will be reconciled ; it may indeed be regarded as far more widely operative than is commonly supposed, for it will be very difficult to prove, that it has not a share in very many chemical metamorphoses, especially in those of the organic compounds. We ought, nevertheless, to weigh well the evil of introducing into an exact science, like chemistry, any thing like occult causes, which are little better than nick-names ; for while we thus fancy we comprehend the essence of a power, we turn away our enquiries from its still hidden nature, and thus postpone the period of its just explication.

REPORT OF THE DIRECTORS OF THE
THAMES TUNNEL COMPANY,

TO THE

*General Assembly of Proprietors held at the London Tavern,
on the 1st day of March, 1842.*

GENTLEMEN,

YOUR Directors, with no ordinary satisfaction, once more meet the General Assembly of the Proprietors of the Thames Tunnel, to announce to them the near completion of this great work.

The entire brickwork of the horizontal roadways, and the two shafts for the footway descents have, in the course of the last year, been safely completed.

The entire brick structure, therefore, of the Tunnel, uniting the two opposite shores of the Thames, is now wholly completed, requiring only works of an ordinary character, to speedily adapt it for public use.

The staircases of the two shafts for foot passengers have been contracted for by Messrs. Grissel and Peto, and will be completed in a few months, when the Tunnel will be forthwith opened to the public as a thoroughfare.

Your directors must also express their satisfaction at the strong and durable character of the work, notwithstanding the trials it has undergone by the repeated irruptions of the River, and the loose and dangerous nature of the ground through which the work of excavation and of construction has been carried on. The brickwork remains perfectly solid and secure in all parts. Once erected under the protection of the Shield, it has never given way in the slightest degree; nor has a step in advance, once gained, and secured by brickwork, ever had to be reconstructed, even though newly done and exposed to the utmost fury of the torrents of irruptions.

Your directors deem it their duty to state this, because it furnishes an explanation both of the cost and of the delay of the work.

In an enterprise of this description, under a deep navigable tidal river, intended to serve for ages as a daily thoroughfare for thousands, they have fully entered into the views of their engineer so to build the structure, as to admit of no doubt of its stability. Your directors have before stated to the proprietors their reasons for thinking, that but for the condition imposed upon them, when the Loan of Exchequer Bills was made, they could have completed the work for a less sum than that which has been expended, and as securely. Of that condition they do not complain; because from the peculiar nature of the work upon the security of which the Loan was made, they were bound to secure the most hazardous portion of it, before any part of the Loan was expended upon the purchase of the property on the Middlesex shore; and as the whole horizontal shaft was considered to come within this description, the engineer was obliged to carry on the works as continuously as the state of the ground would permit, from south to north. Your directors explained this in their report of 1839, as follows:

“It had been found by experience that the attempt to continue the work of excavation when the soil was peculiarly loose and disturbed, was disadvantageous, inasmuch as the cost of the work was enhanced, without a proportionate progress, and that an

occasional suspension of this portion of the work was even favourable to its ultimate progress, inasmuch as during that time, the ground became naturally consolidated, and more easily and safely excavated. In order, however, to prevent any loss to the Company, whenever it was necessary to stop the advance of the Shield, Mr. Brunel proposed to commence the work on the north side of the river, with a view to ensure employment for the men above, when their labours were suspended below ground. Thus, though the work was to be suspended in one part, it was intended to be progressing in another, and the whole establishment was to be kept in constant employment, to the manifest advantage of the public and the proprietors.

"This plan was, however, abandoned with regret, upon its being considered to be inconsistent with the condition under which the public money was granted, viz., that 'the most hazardous part of the work' should be first finished, before any other portion was commenced."

The directors now repeat their conviction, from their further experience, that could they have adopted the plan laid before them by Sir I. Brunel, the work would not only have been less costly, but it would have been finished at an earlier period.

Your directors have considered it due to the engineer, and to themselves, to recall especially this circumstance to the recollection of the proprietors at this time. They repeat, that they have no intention to complain of the condition framed by the Treasury. Many persons well qualified to judge, and many high professional authorities entertained an opinion, that so great and so various were the natural difficulties to be overcome, and so tremendous and novel the obstacles which arose in the course of the work, that even when within a short distance of the Middlesex shore, no engineering skill nor invention would overcome them.

The work is now, however, all but completed. The high respectability of the contractors is a guarantee for the finishing of that portion of the work now entrusted (under the superintendence of Sir I. Brunel) to them; and in a very short period

of time, this most difficult and quite unprecedented undertaking, at a point where no bridge could have been erected, but where a communication between the two sides of the river was much wanted, will be opened to the public;—a monument not only of the science and perseverance of the engineer, but of the spirit and enterprize of the country;—and beneath the Thames, a safe and commodious thoroughfare will be established, through which, however, few who pass will be able fully to appreciate the labor, anxiety, and genius required to accomplish it.

Your directors have endeavoured, faithfully to the proprietors and to the public, to discharge the arduous duty they have had at times to perform. The expense, difficulties, and delays of the work, have compelled them frequently to ponder well over its progress, especially at those moments when the opinions of practical and competent judges were opposed to their own. They have never themselves been discouraged, nor have they ever found the resources of their engineer to fail, even under apparently insuperable difficulties. Your directors, in thus bearing their testimony to Sir. I. Brunel, must not forget to discharge another pleasing duty, in recording also that they, equally with the chief engineer, have been most zealously and ably seconded by Mr. Page, the acting engineer and the assistants, and no less so in another department by Mr. Charlier, the clerk of the company, of whose zeal and energy they cannot speak too strongly.

Neither can they close this report without acknowledging, as they have done on many former occasions, the liberal aid and encouragement they have always received from the Corporation of the City of London, the Navigation Committee, and their officers, the Harbour Masters. They have had, on many occasions, to ask the assistance of the Board of Admiralty, which has always been most readily given them. And lastly, they feel it is due to the public press, now that all the principal difficulties of the work are past, to state that they have received an honorable and disinterested support on many trying occasions, which has materially tended to encourage them in the discharge of their duty.

Your directors will notify to the proprietors, as soon as they can, the day the Tunnel will be opened to them in the first instance, and they trust that in bringing thus far to a conclusion this truly national work, that they shall receive the approbation of their brother proprietors.

Statements of the receipts and expenditure of the Company, for the year which ended the 31st December, 1841, have been prepared, and are now submitted for the information of the proprietors.

BENJAMIN HAWES, *Chairman.*

List of Patents

Granted by the French Government from the 1st of July to the 30th of September, 1840.

(Continued from page 66, Vol. XX.)

Bataille and Derugue, of Rouen, for a machine for printing at the same time the ground and borders of silk handkerchiefs.
Baud de St. Maurice, of Paris, for bathing tubs in impermeable tissue.

Bavoil, of Paris, for improved keys for turning the nuts of screws.

Bellème, of Paris, for improvements in looms.

Benoit, of Lodive, for a process to prevent written paper from being bleached and the ink removed.

Berard, of Paris, for distillation of resinous matters.

Berendorf, of Paris, for a new pump.

Bergerolle, of Sedan, for a machine for dressing the boxes of wheels.

Beslay, of Paris, for improvements in the drawing and casting of zinc.

Billette, of Rouen, for a spinning machine.

Blanchet, Brothers, and Kleber, of Rives, for an improved roller for manufacturing paper.

Boisselot and Sons, of Marseilles, for new machinery for pianos.

Bonhomme, of Lyons, for a new mechanical power.

Bonnefoi, of St. Etienne, for a mode of engraving, *in alto*, gun barrels.

Bornitz, of Paris, for an apparatus for baths and shower baths.

Bouchon, of Paris, for new trousers straps.

Boudreaux, (Mad^e.) of Passy, near Paris, for shoes for workmen.

Boulfroy, of Paris, for a new manner of singeing fabrics, by means of gas.

Bourgaud, of St. Etienne, for improvements in the locks of fire-arms.

Bravard, of Paris, for an improved snap for jewellery.

Breteau, of Paris, for an improved lock.

Breuil, of St. Etienne, for improvements in the manufacture of gun barrels.

Brevet, of Pithiviers, for a mechanical billiard table.

Briet, of Paris, for improvements in the manufacturing of gaseous liquids.

Brisset, of Paris, for a roller to be used in lithographic printing.

Broquet and Marie, of Paris, for an improved method of disinfecting cesspools.

Brossier, of Paris, for a new system of trousers straps.

Bruneaux and Demormant, of Paris, for a machine for combing wool.

Brunet, Brother and Sister, of Paris, for a machine for thrashing corn.

Brunet and Brigaudin, of Paris, for a new lock.

Bureau and Gervais, of Verneul, for dentifrice water.

Burin, of Clermont-Ferrand, for a new produce, called coffee sugar.

Cabaret, of Réthel, for baking bricks and lime.

Camiron, of St. Stèphe, for improvements in certain instruments used in agriculture.

Canning, of Paris, for a new method of circulating heat.

Canning, of Paris, for improved scales.

Carrier, of Paris, for the manufacture of impermeable hats.

De Castro and de Salazar, of Paris, for new bricks.

Cavé and Lemaître, of Paris, for a method of condensing all or part of the steam from engines.

- Chanès, of Paris, for a child's *bourrelet*, in goose quills.
- Chapuy and L'Huillier, of Paris, for mechanism for drawing window blinds.
- Charpentier Appart and Foullon, of Paris, for blinds for carriages.
- Chaussard, of Paris, for an improved fire-box.
- Chéradame, of Paris, for an apparatus to receive smoke and transform it into water.
- Chevalier, of Paris, for an improved califyer.
- Chomeau, of Paris, for a pump for the purpose of extracting syrup from sugar loaves.
- Chomeau, of Paris, for a machine for grinding chocolate.
- Chosson and Lemoine, (Mesdames,) of Paris, for a new kind of cap and bonnet.
- Claudot, of Verdun, for an apparatus for warm air.
- Clément, of l'Ile St. Ouen, for a new bolting apparatus, to be used in flour mills.
- Cluesman, of Paris, for improvements in pianos.
- Coade, of Passy, for an improved method of towing boats.
- Cocheteux, of Templeure, for a new tissue.
- Cointry and Sons, of Mantes, for a furnace for carbonising wood.
- Collas, of Paris, for improvements in carriages of all kinds.
- Collot, of Paris, for a new method of delivering baths at the residence of customers.
- Cosserat, of Sedan, for an economical stove.
- Cote and Gavelle, of Lyons, for an apparatus for the distribution of gas.
- Cotelle, of Paris, for a machine for excavating and carrying away earth.
- Cottiau, of Paris, for corks for powder horns.
- Cousin, of Bordeaux, for a filter for sugar refiners.
- Croyset, of Cutz, for a new plough and harrow.
- Dages, of Paris, for a preparation of whalebone for umbrellas.
- Damon, of Viviers, for a mill for cutting leaves
- Darbier, of Ivry, near Paris, for the application of bitumen in the construction of cellars, aqueducts, &c.
- Dariès, of Paris, for a mode of preparing cubebs.

- Daudeville and Co., of St. Quentin, for new trimmings for curtains.
- David, of Metz, for improvements in the rolling of iron.
- Deboves, of Paris, for a new brush.
- Debrieux, Sons, and Co., of Lyons, for a kitchen stove.
- Desbreux, of Paris, for improved water-closets.
- Delagrange Buée, of Martinique, for fibrous substances for making paper, extracted from the leaves of the banana tree.
- Delarocque, of Luneray, for an improved loom.
- De Delloy d' Avaise, of Paris, for an improved mill.
- Delmas, of Paris, for an impermeable hat.
- Debrieux, of Lyons, for an economical stove.
- Demichelis and Monnier, of Paris, for a rotary steam-engine.
- Denille, of Paris, for an improved scarifier.
- Denuelle, of Paris, for improvements in manufacturing hardware.
- Derrieq, of Paris, for typographical printing of music.
- Desains, of Epernay, for an improved method of tipping with iron the working parts of wooden shovels.
- Desains, of Epernay, for a process to prevent the oxidation of iron wire.
- Deschamps, Jun., of Rouen, for metrical stays.
- Decroizilles, of Paris, for a smoke-consuming hearth for ovens, boilers, &c.
- Desers, of Rouen, for an improved painting brush.
- Detrez and Co., of Wazemmes, for a new woven fabric.
- Devisme and Tiesset, of Paris, for a new shot bag.
- Dida, of Paris, for a mechanical extinguisher.
- Domergue, Count de Rozet, of Paris, for a fibrous substance from the bark of the mulberry tree.
- Doudan, of Cambrai, for a new fabric for making petticoats with *tournures*.
- Doumaux Brothers, of Clermont-Ferrand, for Persian blinds in iron.
- Dubose Brothers, of Rouen, for a machine for printing fabrics.
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List of Patents

Granted for SCOTLAND, subsequent to February 22nd, 1841.

To William Baker, of Grosvenor-street, Grosvenor-square, in the county of Middlesex, for certain improvements in the manufacture of boots and shoes.—Sealed 23rd February.

George Haden, of Trowbridge, in the county of Wilts, engineer, for certain improvements in apparatus for warming and ventilating buildings.—Sealed 23rd February.

Joseph Henry Tuck, of the New North Road, Hoxton, in the county of Middlesex, engineer, for improvements in apparatus or machinery for making or manufacturing candles.—Sealed 25th February.

Hugh Lee Pattinson, of Bensham Grove, Gateshead, in the county of Durham, manufacturing chemist, for improvements in the manufacture of white lead, part of which improvements are applicable to the manufacture of magnesia and its salts.—Sealed 25th February.

Matthew Allen, of High Beech, in the county of Essex, Doctor in Medicine, for an improvement in producing uneven surfaces on wood,—being a communication from abroad.—Sealed 2nd March.

Thomas Stopford Jones, of Stafford-place, Pimlico, in the county of Middlesex, Gent., for certain improvements in machinery for propelling vessels by steam or other power.—Sealed 2nd March.

Joseph Drew, the Younger, of St. Peter's Port, in the Island of Guernsey, confectioner, for an improved method of rolling and cutting lozenges, and also for cutting gun wads and other similar substances, by means of a certain machine, designed by him, and constructed of divers metals and wood.—Sealed 7th March.

Joseph Garnett, of Haslingden, in the county of Lancaster, *dyer*, and John Mason, of Rochdale, in the same county, machine maker, for certain improvements in machinery or apparatus employed in the manufacture of yarns and cloth, and also for certain improvements applicable to the same,—being a communication from abroad.—Sealed 8th March.

George Jarman, of Leeds, in the county of York, flax and cotton spinner; Robert Cook, of Hathersage, in the county of Derby, heckle and needle manufacturer; and Joshua Wordsworth, of Leeds, aforesaid, machine maker,—for certain improvements in machinery for spinning flax, hemp, and tow.—Sealed 9th March.

James Ions, of Newcastle-upon-Tyne, Gent., for improvements in smelting copper ores.—Sealed 10th March.

Julius Bordier, of Austin Friars, in the city of London, merchant, for certain improvements in preparing skins and hides, and converting them into leather,—being a communication from abroad.—Sealed 11th March.

Richard Lawrence Sturtevant, of No. 42, Church-street, Bethnal-green, in the county of Middlesex, soap manufacturer, for certain improvements in the manufacture of soap.—Sealed 14th March.

William Hickling Burnett, of Ravensbourne Wood Mills, Deptford Creek, in the county of Kent, Gent., for improvements in machinery for cutting wood, and in apparatus connected therewith, part of which may be applied to other purposes.—Sealed 14th March.

George Weldes, of Coleman-street, London, merchant, for improvements in the manufacture of white lead,—being a foreign communication.—Sealed 16th March.

New Patents

SEALED IN ENGLAND.

1842.

To William Newton, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, civil engineer, for certain improvements in regulating the flow of air and gaseous fluids,—being a communication.—Sealed 25th February—6 months for inrolment.

Osborne Reynolds, of Belfast, Ireland, clerk, for certain improvements in covering streets, roads, and other ways, with wood; and also in the means of enabling horses and other animals to pass over such roads and other slippery surfaces, with greater safety than heretofore.—Sealed 25th February—6 months for inrolment.

John Birkby, of Upper Rawfold, card manufacturer, for improvements in the manufacture of wire cards.—Sealed 25th February—6 months for inrolment.

William Saunders, of Brighton, Sussex, Gent., for improvements in apparatus employed in roasting and baking animal food.—Sealed 25th February—6 months for inrolment.

Samuel Morand, of Manchester, merchant, for improvements in machinery or apparatus for stretching fabrics.—Sealed 26th February—6 months for inrolment.

Benjamin Gillot, of Great Saffron Hill, cutler, for improvements in heating and ventilating.—Sealed 26th February—6 months for inrolment.

Marc La Riviere, of London Fields, Hackney, Gent., for certain improvements in the machinery for figure weaving in silk and other fabrics.—Sealed 1st March—6 months for inrolment.

Thomas Smith, of Northampton, plumber, for an improvement or improvements in water closets.—Sealed 1st March—6 months for inrolment.

George Carter Haseler, of Birmingham, jeweller and toy-maker, for improvements in the tops of scent bottles.—Sealed 3rd March—6 months for enrolment.

Edward Slaughter, of Bristol, engineer, for improvements in the construction of iron wheels for railway and other carriages.—Sealed 4th March—6 months for enrolment.

James Clements, of Liverpool, manufacturer of toys, for improvements in composition for ornamenting glass and picture frames, and articles for interior and other decorations; also for the manufacture of toys and other fancy articles.—Sealed 4th March—6 months for enrolment.

William Palmer, of Sutton-street, Clerkenwell, manufacturer, for improvements in the construction of candle lamps.—Sealed 4th March—6 months for enrolment.

William Palmer, of Sutton-street, Clerkenwell, manufacturer, for improvements in vessels for making infusions or decoctions, and for culinary purposes, and in apparatus for measuring or supplying from vessels.—Sealed 4th March—6 months for enrolment.

Henry Barron Rodway, of Birmingham, wine merchant, for improvements in the manufacture of horse-shoes.—Sealed 7th March—6 months for enrolment.

Thomas Henry Russell, of Wednesbury, Staffordshire, iron tube manufacturer, and Cornelius Whitehouse, of the same place, for improvements in the manufacture of welded iron tubing.—Sealed 7th March—6 months for enrolment.

William Newton, of the Office for Patents, 66, Chancery-lane, Middlesex, civil engineer, for an improved machine or apparatus for weighing various kinds of articles or goods,—being a communication.—Sealed 7th March—6 months for enrolment.

John Green, Jun., of Newtown, Worcester, farmer, for certain improvements in machinery or apparatus for cutting or reducing turnips, mangel wurzel, carrots, and other roots, for food for horned cattle, horses, and other animals.—Sealed 7th March—6 months for enrolment.

John George Bodmer, of Manchester, engineer, for certain im-

provements in machinery or apparatus for cleaning, carding, roving, and spinning cotton and other fibrous substances.—Sealed 7th March—6 months for enrolment.

James Readman, of Islington, Gent., for a certain improvement or improvements in the barometer.—Sealed 7th March—6 months for enrolment.

John Duncan, of Great George-street, Westminster, Gent., for improvements in machinery for excavating soil, being a communication.—Sealed 7th March—6 months for enrolment.

John Warrick, of Lawrence Pountney Lane, Cannon-street, merchant, for an apparatus called a *gasoscope*, and intended to shew the presence of bi-carbureted hydrogen gas, (the gas used for lighting) in mines, wells, houses, buildings, rooms, and vaults; and consequently to prevent the explosions and accidents liable to be produced by the said gas.—Sealed 7th March—2 months for enrolment.

Francis Kane, of Cumberland-street, Middlesex Hospital, mechanic, for improvements in the construction of fastenings for the parts of bedsteads and other frames.—Sealed 7th March—6 months for enrolment.

Sir Francis Desanges, of Upper Seymour-street, Portman-square, Knight, and Anguish Honour Augustus Durant, of Long Castle, Shropshire, Esq., for improvements in apparatus for sweeping and cleansing chimnies or flues, and extinguishing fires therein, which they intend to call "*ramoneur*."—Sealed 7th March—6 months for enrolment.

Robert Frampton, of Cleveland-street, Fitzroy-square, coach-maker, for improvements in the construction of hinges.—Sealed 7th March—6 months for enrolment.

Thomas Hedley, of Newcastle-upon-Tyne, Gent., and Cuthbert Rodham, of Gateshead, Durham, millwright, for an improved apparatus for purifying the smoke, gases, and other noxious vapours, arising from certain fires, stoves, and furnaces.—Sealed 8th March—6 months for enrolment.

William Catford, of Chard, Somersetshire, mechanic, for certain improvements in machinery or apparatus, for making or ma-

nufacturing lace or other netted fabrics.—Sealed 8th March—6 months for inrolment.

Henry Smith, of Liverpool, engineer, for improvements in the construction of wheels and breaks for carriages.—Sealed 10th March—6 months for inrolment.

Richard Beard, of Earl-street, Blackfriars, Gent., for improvements in the means of obtaining likenesses and representations of nature and of other objects.—Sealed 10th March—6 months for inrolment.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, Middlesex, civil engineer, for certain improvements in boilers, furnaces, and steam-engines,—being a communication.—Sealed 10th March—6 months for inrolment.

Charles William Firchild, of Woley Park, Northfield, Worcestershire, farmer, for an improved propelling apparatus, for marine and other purposes.—Sealed 14th March—6 months for inrolment.

Reuben Partridge, of Cowper-street, Finsbury, engineer, for certain improvements in machinery or apparatus for splitting and shaping wood into splints, for the manufacture of matches and other similar forms.—Sealed 14th March—6 months for inrolment.

Alfred Green, of Sheffield, surgical instrument maker, for certain improvements in trusses or surgical bandages.—Sealed 15th March—6 months for inrolment.

Edwin Ward Trent, of Old Ford, Bow, rope maker, for an improved mode of preparing oakum and other fibrous substances, for caulking ships and other vessels.—Sealed 21st March—6 months for inrolment.

Sydney Jessop, of Sheffield, merchant, for an improved mode of preparing wrought iron, intended for wheel tires, rails, and certain other articles.—Sealed 21st March—6 months for inrolment.

Zachariah Parkes, of Birmingham, manufacturer, for an improved mode of preparing wrought iron, intended for wheel tires, rails, and certain other articles.—Sealed 21st March—6 months inrolment.

John Clay, of Cottingham, near Hull, Yorkshire, and **Frederick Rosenborg**, of Sculcoates, Yorkshire, Gent., for improvements in arranging and setting-up types for printing.—Sealed 21st March—6 months for enrolment.

William Hancock, the Younger, of Amwell-street, Gent., for certain improvements in combs and brushes.—Sealed 21st March—6 months for enrolment.

Edward John Dent, of No. 82, Strand, chronometer maker, for certain improvements in chronometers and other time-keepers.—Sealed 21st March—6 months for enrolment.

William Brockedon, of Queen-square, Middlesex, Gent., for improvements in manufacturing fibrous materials, for the cores of stoppers, to be coated with India-rubber, and used for stopping bottles and other vessels.—Sealed 21st March—6 months for enrolment.

John Haughton, of Liverpool, clerk, for improvements in the method of affixing certain labels.—Sealed 21st March—6 months for enrolment.

William Palmer, of Sutton-street, Clerkenwell, manufacturer, for improvements in the manufacture and preparation of pills and some other articles of a medicinal or remedial nature.—Sealed 21st March—6 months for enrolment.

Mark Freeman, of Sutton Common, Gent., for improvements in the construction of inkstands.—Sealed 21st March—6 months for enrolment.

Robert Hazard, of Clifton, Somerset, confectioner, for improvements in apparatus for heating public and private buildings.—Sealed 21st March—6 months for enrolment.

Moses Sperry Beach, of Norfolk-street, Strand, printer, for improvements in machinery used for printing with type, and in the construction of type for printing,—being a communication.—Sealed 23rd March—6 months for enrolment.

CELESTIAL PHENOMENA FOR APRIL, 1842.

D. H. M.		D. H. M.	
1	Clock before the sun 4m. 1s.	15	Juno R. A. 16h. 43m. dec. 6.
—	☽ rises 1h. 21m. M.	—	31. S.
—	☽ passes mer. 4h. 54m. M.	—	Pallas R. A. 1h. 22m. dec. 3. 3. S.
—	☽ sets 8h. 26m. M.	—	Ceres R. A. 3h. 9m. dec. 14.
—	Juno stationary	—	24. N.
—	Occul α^2 Sagittarii, im. 14h. 52m.	—	Jupiter R. A. 19h. 33m. dec. 21.
	em. 15h. 16m.	—	45. S.
2 6 30	☽ in ☐ or last quarter.	—	Saturn R. A. 19h. 2m. dec. 22.
9 1	☿ in conj. with ☽ diff. of dec.	—	5. S.
	1. 44. N.	—	Georg. R. A. 23h. 46m. dec. 2.
10 22	Pallas in conj. with the ☉	—	14. S.
22 11	♃ in conj. with the ☽ diff. of dec.	—	Mercury passes mer. 22h. 40m.
	0. 32. S.	—	Venus passes mer. 0h. 39m.
8 19	☿ in ☐ with the ☉	—	Mars passes mer. 1h. 15m.
4 16 53	♃'s third satt. will im.	—	Jupiter passes mer. 17h. 58m.
6	Clock before the sun 2m. 49s.	—	Saturn passes mer. 17h. 26m.
—	☽ rises 3h. 29m. M.	—	Georg. passes mer. 22h. 10m.
—	☽ passes mer. 8h. 8m. M.	—	Clock before the sun, 0h. 5m.
—	☽ sets 0h. 57m. A.	—	☽ rises 7h. 3m. M.
12	☽ in Apogee.	—	☽ passes mer. 3h. 51m. A.
8 9 30	♄ in conj. with ☽ diff. of dec.	—	☽ sets Morn.
	7. 21. S.	18 6 32	☽ in ☐ or first quarter.
14 23	Her. in conj. with the ☽ diff. of	19	Vesta in Aphelion
	dec. 5. 36. S.	20	Clock after the sun, 1m. 6s.
10	Clock before the sun, 1m. 24s.	—	☽ rises, 1h. 32m. A.
—	☽ rises 4h. 39m. M.	—	☽ passes mer. 8h. 27m. A.
—	☽ passes mer. 11h. 34m. M.	—	☽ sets 2h. 46m. M.
—	☽ sets 6h. 46m. A.	16 41	♃'s first satt. will im.
4 51	♄ in conj. with Her. diff. of dec.	18 55	♄ greatest Hel. Lat. S.
	1. 58. S.	21 10	☽ in Perigee.
10 31	Ecliptic conj. or ● new moon.	23 10 18	☿ stationary.
11 4 30	♃ in ☐ with the ☉	24 11 28	Ecliptic oppo. or ☉ full moon
10 18	♀ in conj. with the ☽ diff. of dec.	25	Clock after the sun, 2m. 6s.
	6. 5. S.	—	☽ rises, 8h. 39m. A.
12 6 38	♂ in conj. with the ☽ diff. of	—	☽ passes mer. Morn.
	dec. 4. 49. S.	—	☽ sets 4h. 19m. M.
13 14 47	♃'s first satt. will im.	26 14 58	♃'s second satt. will im.
15	Mercury R.A. 0h. 11m. dec.	29 13 3	♃'s first satt. will im.
	1. 35. S.	18 3	☿ in conj. with the ☽ diff. of dec.
—	Venus R. A. 2h. 13m. dec. 12.		1. 26. N.
	45. N.	22 17	♄ in conj. with Pallas, diff. of
—	Mars R. A. 2h. 47m. dec. 16.		dec. 11. 21. N.
	22. N.	30 10 21	♃ in conj. with the ☽ diff. of
—	Vesta R. A. 3h. 43m. dec. 16.		dec. 0. 2. N.
	37. N.	17 23	♀ in the ascending node.

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No. CXXV.

Recent Patents.

To JOHN CLAY, of Cottingham, in the county of York, Gent., and FREDERICK ROSENBORG, of Sculcoates, in the county of York, Gent., for their invention of improvements in arranging and setting-up types for printing.—[Sealed 27th November, 1840.]

THIS invention of improvements in arranging and setting-up types for printing, consists in a novel construction of machine, in which printing types (being placed in a certain order) may be severally selected and brought together for the formation of words and sentences, by striking keys with the finger, in a similar manner to playing upon an organ.

In Plate X., fig. 1, represents a front elevation of the machine; fig. 2, is an elevation of the left-hand end of the machine, part of the wooden frame being in section; fig. 3, is a horizontal view of the machine, shewing the parts as they would appear when seen from above; and fig. 4, is a vertical section, taken through the middle of the machine,

in a transverse direction, or at right angles to fig. 1; in all which figures similar letters of reference point out the same parts of the mechanism.

A complete font of types being provided, of any size required, consisting of upper and lower case, that is, capitals and small letters, points, spaces, figures, &c., both Roman and Italic,—all the types of one letter or character are placed in similar positions, in one of the perpendicular grooves of the vertical plates *A*, or *B*, fixed at the top of the machine, and all the types of another letter or character in another perpendicular groove of the plates, and so on; the types of all the letters, points, spaces, figures, &c., being arranged in this way in the most convenient order for use.

The grooved plates *A*, and *B*, being thus filled with letter, *A*, *A*, *A*, with capitals, and *B*, *B*, *B*, with small letters, &c., the movements of the mechanism are to draw out, severally, from the grooved plates, such letters or characters, successively, as are required for composing a word or sentence.

These movements are effected by striking, with the finger, certain of the keys *C*, *C*, *C*, or *D*, *D*, *D*, in front of the machine; which keys, being connected to levers, perform the operations by the means about to be described.

In the vertical section, fig. 4, will be best seen the forms of the levers *c*, *c*, *c*, and *d*, *d*, *d*, connected to the keys *C*, and *D*, by which the fingers of the operator are enabled to act upon the letters.—These levers *c*, *c*, *c*, and *d*, *d*, *d*, hang upon fulcrum rods *e*, *e*, *e*, fixed in the wood frame, and at their reverse ends act against the mechanism which selects and conducts the types into the chamber *f*, the receptacle of the composition.

Let it be supposed that the machine has been properly furnished with types. The compositor places himself in front of the machine, and presses with his finger the par-

ticular key, answering to any letter required.—We will say, to commence a sentence, he strikes one of the keys *c*, which belong to the upper-case or capital letters. The hinder parts of the levers *c*, attached to these keys, are bent upwards, and are all made, at their upper parts, to coincide with each other exactly, both in form and position, as to longitudinal arrangement. They are also, each of them, weighted by a tail-weight *g*, for the purpose of keeping them to their proper bearings.

On depressing the key *c*, that part of the lever *c*, which is marked *h*, comes first into operation against the edge of a snail-formed bar *e*, which extends along the front of the machine.—This bar *e*, is capable of turning on pivots at its ends, inserted into the frame-work; and from it, at one end, extends a fixed arm or lever *i*. To this lever or arm *i*, is attached, by a pin, a perpendicular rod *k*, adjustable, as to its length, by a screw; the operations of which rod will be best seen in the front view, fig. 1, or in the partial vertical section, taken longitudinally through about the middle of the machine, shewn at fig. 5.

The upper end of the rod *k*, is connected to a small arm *l*, extending from a transverse shaft *m*, which shaft is seen best in the horizontal view, fig. 3. From this shaft *m*, an arm *n*, extends, carrying a toothed sector, (see figs. 1, 3, and 5,) which takes into a pinion *o*, on a small shaft *p*.—This shaft *p*, also carries a toothed-wheel *q*, taking into a pinion *r*, on the shaft or axle of the pulley *s*. To this pulley *s*, is made fast the two ends of a cord *t*, *t*, seen best in fig. 5; and the cord, being passed over a carrier pulley *j*, is connected to a sliding piece *r*, called the conductor, (shewn detached at figs. 6 and 7,) which is moved along the horizontal plane or channel *g*, *g*, for the purpose of conducting the types severally, after they have been brought into the channel *g*, to the receiver at the end of

the channel, which receiver answers to the office of a composing-stick.

The further operation of the lever *c*, by which the types *a*, are severally brought out of the grooved plate *A*, on to the horizontal plane or channel *G*, ready to be acted upon by the conductor, is as follows:—

The upper extremity of the lever *c*, marked *u*, (see fig. 4,) as it is made to advance by the depression of the key, comes into contact with the end of a slider *H*, (of which slider there are a series, corresponding to the several keys,) shewn in the partial horizontal fig. 8. The reverse ends of the sliders *H*, severally act against the shoulder of one of the vertical levers *i*; the extremity of which lever *i*, passes through an eye or opening in a horizontal rod *v*. By these rods *v*, of which there are a series, (see fig. 3,) corresponding to the keys, the types *a*, are pushed out of their respective grooves, through the back of the plate *A*, on to the horizontal plane or channel *G*, ready to be conducted to the receiver, whence it is carried to the chamber *f*, by means hereafter described.

The construction and arrangement of the working parts of one set of the keys having been explained, we now proceed to describe the operation of composing. Let one of the keys *c*, be struck by the finger, then that part of the lever *c*, at *h*, will first press back the edge of the snail-bar *x*, and thereby cause the arm *i*, to draw down the rod *k*. The descent of this rod *k*, will bring down the arm *l*, and consequently turn the axle *m*, which will raise the sector-rack *n*, and by that means give rotary motion to the pinion *o*. The rotation of this pinion *o*, will cause the shaft *p*, and toothed-wheel *q*, to turn with it, and to drive the pinion *r*, and pulley *s*, and thereby traverse the cord *t*, *t*, by which the conductor *x*, is slidden back upon the plane *G*, from its state of rest, at the left-hand end of the plane *G*,

into a situation ready to catch the type, and conduct it to the receiver.

The upper end of the lever *c*, at *u*, now forcing back the slider *h*, will cause the vertical lever *i*, to project the pusher-rod *v*, forward, and in so doing to push the lower type of the column *a*, through the aperture at the bottom of the plate *A*, on to the horizontal plane *g*.

Now, on withdrawing the finger from the key *c*, the lever *c*, will be brought back by its weight *g*, into its state of rest, when a bent spring *w*, will restore the position of the vertical lever *i*, and bring back the pusher-rod; at which time also the tension of a convolute spring *x*, affixed to the shaft *p*, will, through the wheel and pinion *q*, and *r*, give a retrograde movement to the pulley *s*, and thereby cause the cord *t*, to drive the conductor *f*, back to its place of rest, and in so doing to slide the type *a*, upon the horizontal plane *g*, up to the receiver or aperture of the chamber *f*.

It may be proper here to remark, that the conductor *f*, should not be slidden back upon the horizontal plane *g*, further than is absolutely necessary to take hold of the type, in whatever part of the horizontal plane the type may lie; its situation upon the plane *g*, depending upon the arrangement of the various types in the grooves of the plates *A*, or *B*. The distance to which the conductor is brought back, at every stroke, is regulated by varying the lengths of the respective slides *h*, according to the distance from the end of the plane of the column of types with which the slider is in communication.

The operations of the keys, corresponding with the lower-case or small letters, are much the same as those of the upper-case, above described.

The keys *D*, *D*, *D*, belonging to the lower-case or small letters, placed in the plate *B*, at the back of the machine,

are affixed to the levers *d, d, d*, which hang upon fulcrum-rods *e, e, e*, set in the frame-work. The extremities of the longer arms of these levers *d, d, d*, are guided by passing through slots, of determinate lengths, in a vertical plate *κ*; and openings, near the ends of these levers, severally receive the lower extremities of vertical sliders or jacks *L*; the actions of which are guided, at their upper parts, by a comb *y*.

On striking any one of the keys *D*, the lever *d*, will lift the jack *L*, (as far as the slot in the plate *κ*, will allow,) and bring the shoulder *h**, to act against and raise the edge of the snail-bar *z**, which will cause the arm *i**, and vertical rod *k**, to be depressed.—This rod *k**, acts upon the arm *l**, (see fig. 3,) and turns the transverse shaft *m*, as before described; by which means the pulley *s*, is driven round, and the cord *t*, made to work the conductor *F*, upon the horizontal plane *G*, in the way already explained. The rising of the slider or jack *L*, (the length of which is determined in the same way as that of the slide *H*,) brings its upper end at *o**, to act against the shorter arm of the vertical lever *r**, (a detached horizontal section of which, taken at this level, is shewn at fig. 9); and this vertical lever *r**, in the same manner as before stated, projects the pusher-rod *v**, which drives a type *b*, out of the grooved plate *B*, on to the horizontal plane *G*, ready to be carried to the receiver by another action of the conductor *F*, as before described.

The mechanism, whereby the successive types are arranged to form lines, and that by which these lines of type are placed, so as to constitute a page or column, is described as follows:—

At the end of the horizontal plane *G*, there are several vertical sliders, by which a vertical recess is formed, fitted to receive the successive types for one range or line of

letters, as shewn at *x*, in fig. 5. The mechanism of this part of the apparatus is seen complete in the end view, fig. 2; and is further illustrated by the several detached figures, hereinafter described.

Through the middle of the machine, immediately below the horizontal plane *g*, a rectangular chamber extends longitudinally, (see figs. 4 and 5,) which is designed to receive the composition as the lines of type successively accumulate. The sides of this chamber are formed by parallel plates *f, f*, set at such distances apart as will leave a space rather longer than the length of a type, for the purpose of receiving the ranges of type, in the order in which they are composed; and the bottom of the chamber is flat, corresponding to the side of the page or column of types.

At the left-hand end of the machine, (see fig. 2,) a face-plate *m, m*, is affixed, through which there is an aperture, coincident with the open end of the composition-chamber *f, f*; and upon this face-plate are attached two parallel pieces *n, n*, dove-tailed on their inner edges, which form a groove for a slider *o, o*, to move in.—This slider *o*, is shewn in fig. 2, and in several positions in the detached figs. 10, 11, and 12. Two other parallel pieces *p, p*, are also attached to the face-plate below, forming the ledges of a groove, in which a sliding-plate *q*, moves up and down in the vertical recess; and upon the face of this sliding-plate *q*, there is a rack, for the purpose of enabling it to be raised or depressed by a pinion. Behind the sliding-plate *q*, there is also, in the same vertical recess, a sliding-fork *r*, designed to constitute a back or bearing for the types which are to be built up upon the top edge of the plate *q*, as shewn at fig. 11.

When the operation of composing a line of types is commenced, the slider *o*, is inserted in its place, as seen in fig.

2, and the forked slider *r*, raised to the top of the recess, by pushing in the handle and rod *a*, *a*, at the under part of the machine; this rod being connected to the angular lever *b*, *b*, attached at its end by a joint to a vertical rod *c*, connected to the lower end of the sliding-fork *r*. This being done, the vertical sliding-plate *q*, is also to be raised in the recess by the following means:—

The hand of the compositor turns the winch and axle *d*, *d*, which axle has fixed upon it a toothed-wheel *e*, taking into a pinion *f*. The axle of the pinion *f*, also carries a pulley *g*, a ratchet-wheel *h*, and a pinion *i*, which takes into the rack *k*, on the face of the vertical sliding-plate *q*. Hence, by turning the winch and axle *d*, the sliding-plate *q*, is brought up and stopped when the top edge of the plate comes into coincidence with the horizontal plane *g*, by a small projecting piece *l*, fixed in the side of the rack coming against the under part of the slider *o*.

The vertical sliding-plate *q*, is held up in this elevated situation by a slightly weighted cord *m*, passed round the pulley *g*; but when that weight is overcome by a pressure on the top edge of the plate *q*, as in depositing the successive types, the plate necessarily descends.

Let it be supposed, that one of the types *a*, has been brought by the conductor *r*, along the horizontal plane *g*, to the recess *f*, at the left-hand end of the horizontal plane, by the means above described, the type will then rest upon the top edge of the vertical sliding plate *q*.

When the next key is struck by the compositor, the axle *m*, (see figs. 3 and 5,) will be slightly turned, as before stated, and an arm *n*, extending from the axle *m*, connected to a longitudinal rod *o*, *o*, as seen in fig. 5, will slide that rod toward the left. The rod *o*, at its left-hand extremity, acts upon one arm of a crank *p*, mounted upon a small transverse spring-axle, (see figs. 2 and 5,) and the

other arm of this crank is connected to a vertical slider q, placed immediately over the recess in which the type lies. By this arrangement it will be perceived that a slight turn given to the axle m, will depress the slider q, which movement will be sufficient to push down the type below the level of the plane, and make room for the next type to lie in the same place upon the former type.

The slightly weighted cord m, as before said, holds up the sliding-plate q, in the recess; but the pressure of the upper slider q, acting upon the type at every stroke, forces down both the type and the plate q, a distance equal to the thickness of the deposited type; and the plate q, is held in its depressed positions, by the spring-clicks r, acting upon the ratchet-wheel h.

In this way, by the successive strokes of the keys of the machine, the types are severally brought out of the grooves of the plates A, and B; and after being slidden along the horizontal plane G, they are placed one upon another, in the vertical recess f, until a range or line of types is found complete; the length of which is shewn by an index s, upon the axle d, turning against a graduated dial-plate t, figs. 1 and 2.

In order to deposit another line of types, in the same way, in the vertical recess, that first formed must be removed into the composition chamber, as shewn in fig. 5; and for this purpose it must, in the first instance, be lowered to the level of the bottom of the composing chamber, shewn in fig. 4. To do this, the clicks r, are to be disengaged from the ratchet-wheel h, by a handle u, and the compositor, by turning back the winch and axle d, brings down the sliding-plate q, until the piece l, comes in contact with a stud v, which indicates that the bottom of the line of types is level with the bottom of the composition chamber.

At the bottom of the composition chamber there is placed a long flat rail *r*, upon which the page or column of types is to be built, as in a composing-stick, and carried away thereon. As an end bearing, for the page or column of types, an upright piece *u*, is attached to the rail *r*, by a dove-tail; in which dove-tail it is enabled to slide back as the successive lines of type are introduced into the chamber.

In commencing the composition, the upright *u*, must be brought forward in the chamber, close up against the back of the sliding-fork *r*. The first line of types having then been built upon the top edge of the sliding-plate *q*, as described, and the line lowered to the position coincident with the chamber, as in fig. 4, the sliding-fork *r*, is then drawn down out of the recess *f*, by drawing out the handle *a*. When this is done, another handle *w*, is forced inward, which turns the vertical shaft *x*; at the upper part of which shaft there is a tooth taking into a forked stud *y*, on the side of a slider *z*, which moves horizontally in the slider *o*.

These sliders *o*, and *z*, are shewn at fig. 2, in their respective places in the machine, and detached therefrom at figs. 10 and 11. Fig. 10, is a front view of these sliders, and fig. 11, a side section of the same.

The slider *z*, *z*, has two vertical ribs at its back part, which pass through long slots in the back plate of *o*; and when the forked lever *y*, is acted upon by the turning of the shaft *x*, as described, the two ribs of the slider *z*, are protruded through the back of the plate *o*, for the purpose of forcing the line of types out of the recess *f*, and bringing them up against the face of the upright *u*, in the composition chamber.

When this has been done, the sliding-fork *r*, is again raised, passing up between the ribs of the slider *z*; and it now stands before the line of types, where it remains ready

to receive another line, to be deposited in the recess *f*, as before described.

The handle *w*, on being now drawn back, causes the ribs of the slider *z*, to retire into the plate *o*, leaving the recess *f*, free. The sliding plate *q*, must then be raised as before, ready to receive upon its top the successive types for forming the next line.

In this way the several lines of type are composed and forced back into the chamber in the form of a page or column, the upright *u*, being made to recede, by the addition of each successive line; and in order to know how many lines of type have been thus placed in the chamber, there is a graduated dial *l*, shewn in figs. 1 and 2, upon the face of which an index moves, fixed upon a shaft 2, 2. At the reverse end of this shaft, there is a ratchet-wheel 3, which is acted upon by a click 4, attached to the end of a small lever 5; and the other end of this lever 5, has a fork, in connection with a tooth, on the vertical shaft *x*. Hence it will be perceived, that every time this shaft *x*, is turned, as at the removal of each line of types into the composition chamber, the ratchet-wheel 3, will be advanced one tooth, and consequently shew, by the index, the number of lines which have passed into the composition chamber. When the page or column is thus completed, the rail *r*, is drawn out with the upright *u*, and the composition laid upon a table, where it is to be imposed.

In projecting the conductor *F*, along the horizontal plane *g*, it is sometimes found, that by the rapidity of the action, the letter is liable to turn over, or be thrown off the plane. To remedy this inconvenience, two small opening latches 6, 6, are placed at the front end of the conductor *F*, (shewn detached in figs. 6 and 7,) and seen best in the horizontal view of the machine at fig. 3. These latches, when the conductor comes up to the type, pass over it and hold the

type securely, and in its right position, as it slides along the plane; and when the type has arrived immediately over the recess *f*, the latches are raised by two small plates 7, 7, seen in fig. 11, and also in the top or edge view of the slider *o*, shewn at fig. 12, which leaves the type free in the vertical recess *f*, and the conductor is allowed to return without touching the type.—[*Inrolled in the Petty Bag Office, May, 1841.*]

Specification drawn by Messrs. Newton and Son.

To JAMES WILLS WAYTE, of the Morning Advertiser Office, Fleet-street, in the city of London, engineer, for certain improvements in machinery or apparatus for letter-press printing.—[Sealed 12th June, 1841.]

THESE improvements in machinery or apparatus for letter-press printing, consist in certain novel arrangements and constructions of the parts of two different kinds of letter-press printing machines, viz:—Those known by the denomination of “platten printing machines,” which are intended to execute the finer sorts of letter-press printing, the form of types being laid upon one flat surface, and the impression obtained by the pressure of another flat surface; and also those constructions of machines in which the forms of types are laid upon a flat surface, but the impression is given by the pressure of a revolving cylindrical surface.

The improvements may be considered under the following heads:—Firstly, the construction of the mechanism by which the platten and the table are brought together, to produce the impression, those two surfaces being both flat; secondly, the mechanism for working the frisket-frame, as applied to the same machine; thirdly, the novel arrangement of the inking apparatus, also applicable to the same;

and fourthly, the mechanism by which a machine, having only one pressing cylinder, is made to print a sheet on both sides, technically called "perfecting."

In Plate X., fig. 1, is a sectional elevation of the platten machine, having the improved parts appended; and fig. 2, is a transverse elevation of the same, partly in section.

The standards and general framing of the machine are marked *a, a, a*, and the driving-pulley or rigger *b*, by which the rotary power is communicated to a pinion *c*, for actuating the several parts of the machine. This pinion *c*, takes into a toothed-wheel *d*, upon the main shaft *e*, which carries the bolts or tappets of the toggle-joint, by which the table is raised and the platten brought down, when the impression is given. The construction of this toggle-joint, and its mode of effecting the pressure, will be clearly seen in the drawing.

The table *f, f*, of the ordinary form and construction, receives the form of types upon its upper flat surface. The platten *g*, hangs over it, having a corresponding flat surface for giving the pressure, when the two are made to approach each other. The table is supported by a short vertical stem *h*, connected at bottom, by a joint, to a right-angled lever *i, i*, pendant upon a pin *j*, fixed in the transverse bracket-bar, which forms a brace to the framing; and the table is guided, in its ascent and descent, by angular ribs on its ends, working in vertical v-shaped grooves, in the side frames. The platten *g*, is supported by ears at its ends, bolted and screwed to the tops of two vertical rods *k, k*, which slide up and down in sockets, affixed to the side-frames; and the lower ends of these rods are connected by a cross-head *l*, (see fig. 2.) To the cross-head a right-angled lever *m, m*, is connected by a joint;—this lever hangs upon a strong axle *n*, affixed to a transverse bar, at the bottom of the framing. The other extremities of the

levers *i*, and *m*, have straps *o*, *o*, connecting them by joints to a right-angled lever *p*, which carries a heavy weight, made adjustable upon the tail of the lever, for the purpose of counter-balancing the additional weight of the form when placed upon the table.

Pendant from the joint, at the bottom of the stem *h*, is an arm *q*, forming the upper piece of the toggle-joint, which arm is taken hold of by the bolt or tappet-pin, on the main shaft *e*, as it revolves, and thereby causes the stem *h*, with the table *f*, and form of types, to be raised. At the same time the other tappet-pin, on the main shaft, acts in a similar way on the end of the other toggle-piece *r*, which causes the cross-head *l*, to descend and bring down the vertical sliding rods *k*, *k*, and the platten *g*, toward the table; by which combined action the pressure is given. When, by the rotation of the main axle, the tappet-pins have escaped from the toggle-pieces *q*, *r*, they are brought back to the quiescent positions shewn in fig. 1, by weighted tail-pieces, which respectively fall against stops, and thereby retain the ends of the toggle-pieces, in such positions as will allow the tappet-pins to take hold of them again when brought round by the rotation of the main shaft.

The movements of the frisket are produced by a tumbling shaft *s*, (seen in fig. 2,) which shaft is connected by an universal joint to the shaft of the pinion *c*, before mentioned, and is thereby made to revolve. The reverse end of the tumbling shaft has a pinion *t*, which takes into the teeth or pins of a mangle-wheel *u*, mounted on a transverse shaft, supported by bearings on the side-frames. Upon the outer end of the shaft of the mangle-wheel is affixed a toothed-wheel *v*, taking into a pinion on the end of a transverse shaft *w*, which carries the two chain-wheels *x*, *x*, whereby the frisket is conducted to and fro. There are four of these chain-wheels *x*, *x*, *x*, *x*, two of them being

shewn in fig. 1; and over these wheels two endless chains *y, y*, are extended, and by the ordinary operation of a tumbling shaft, acting in a mangle-wheel, these chains are made to travel to and fro, with a reciprocating action.

Studs *x, x*, set into the sides of the chains at certain intervals, pass into upright slotted guides *A, A*, standing up from the frisket-frame *B*. Hence it will be perceived, that as the chain goes round in one direction, the studs *x, x*, having passed into the slotted guides *A, A*, will draw along the frisket-frame *B*, which slides in grooves upon the upper edges of the side-frame of the machine; and when the frisket-frame has proceeded so far as to allow the studs to pass up out of the slotted guides, the frisket-frame will then remain quiescent, which takes place at the time that the impression is being given. This interval of rest allows time for laying on a fresh sheet, and when the contrary rotary movement of the mangle-wheel (by which the chain is conducted in the reverse direction) takes place, the frisket will, in like manner, be conducted back again, and the fresh sheet receive its impression.

The inking-rollers *c, c, c*, turn on axles, mounted in eyes at the outer parts of certain links of the endless chains; and as they are conducted to and fro by the chains, through the agency of the mangle-wheel, as before described, they receive their ink from a distributing surface *D*, which is fed from a ductor *E*, at the top of the frame, by the distributing rollers *F, F, F*, which travel from end to end of the machine, upon horizontal rails *G, G*; and as the inking-rollers, in the lower part of this circuit, pass over the form, they communicate their ink to the surface of the types.

A side elevation of a cylindrical printing press is shewn at fig. 3, the mechanism of which is mounted in a frame *a, a, a*. A rigger *b*, is fixed upon the end of a short shaft *c*, carrying a pinion *d*, which takes into the toothed-wheel

e, on the shaft of a cam-wheel *f*. A tumbling shaft is connected, by a universal joint, to the shaft *c*, and at the other end of this tumbling shaft there is a pinion, taking into a horizontal mangle-rack *g*, which rack forms the bottom rail of the frame *h, h*, carrying the table and form of types *A, B*. Hence, as the pinion of the tumbling shaft works in the upper and lower sides of the rack *g*, it drives the table to and fro. On the side of the table there is another horizontal rack, taking into a toothed-wheel on the shaft of the pressing cylinder *k*, by means of which, as the table passes to and fro, a reciprocating rotary motion is given to the pressing cylinder.

The sheet to be printed is fed in and taken hold of by grippers *i*, and by the horizontal progress of the table, the sheet is brought round such a distance as exactly to meet the first line of the form *A*, of types, placed upon the table.

The axle of the pressing cylinder is mounted in plummer blocks, supported by vertical rods *l, l*, which slide up and down in sockets, affixed to the side-frames; the lower ends of these rods being acted upon by springs *m, m*, which force them upwards. An infinite lever or knee-joint, formed by two pieces *n, n*, bears against studs set in the side-frames, and is supported below by a brace, affixed to the vertical rods *l, l*. An arm *p*, extending from the axle of the lower piece *n*, has an anti-friction roller, which works against the periphery of the cam-wheel *f*; and hence, as the larger radius of this cam-wheel comes into operation upon the end of the arm *p*, it will be depressed, and the two portions of the infinite lever or knee-joint *n, n*, be brought into a straight line, thereby drawing down the rods *l, l*, and the pressing roller *k*, and producing the impression. The table, by these means, will be carried to the opposite end of the frame to that in which it is seen in fig. 3, and the tumbling shaft, now acting upon the other

side of the mangle-rack, will cause the table to return, and the pressing cylinder to revolve in the reverse direction.

The first-described rotary motion of the pressing cylinder will have brought the edge of the printed sheet of paper up to the tape rollers *q, q*, which are turned by a band from the motive shaft *c*; and these rollers and their endless tapes, turning in opposite directions, will take the sheet round the roller *r*, and deliver it between the rollers *s, s*, again on to the periphery of the pressing cylinder, ready to receive the impression on its reverse side from the form *B*, as the table returns, the depression of the cylinder being effected by the same means as before described.—The method of inking the types is the same in this as in all other cylinder machines.—[*Inrolled at the Petty Bag Office, December, 1841.*]

Specification drawn by Messrs. Newton and Son.

To THOMAS JOHN DAVIS, ESQ., of 5, Bloomsbury-place, Bloomsbury-square, for certain improvements in the form and combination of blocks of such materials as are now used, or hereafter may be used, in building, or for paving public and private roads and court-yards, or public and private causeways and sub-ways, or any other purposes to which the said form and combination of blocks may be applied.—[Sealed 8th August, 1840.]

THIS invention consists of improvements in the form and in the modes of combining blocks for paving and other purposes.

The blocks are composed of wood, iron, stone, or any other materials now in use for paving or building, and are made of the forms shewn in Plate XI., at figs. 1, 2, and 3.

Fig. 1, is a single rectangular prism; fig. 2, is a double rectangular prism, formed by placing the prism *a*, fig. 1,

upon and across the middle of the upper surface of the prism *b*, which differs in shape and size from the prism *a*; and fig. 3, is a treble rectangular prism, composed by placing the double rectangular prism, fig. 2, upon the single rectangular prism, fig. 1.

The blocks are combined in various ways, (not very clearly described in the specification,) for the purpose of paving roads, and are kept in a vertical position, the combination being strengthened by passing iron or wooden rods through them. They may be so placed as mutually to support each other, without having any openings or spaces in the surface of the road or way; or they may be so placed, that spaces between the blocks are left for stone or other substances, to be filled in, which will prevent horses or other animals from slipping. The blocks are also used in the construction of the arches of railway bridges, &c., being bound together by iron or wooden rods.

The patentee claims, Firstly,—The shape of the compound blocks or prisms, which he calls stereo-prisms.

Secondly,—The mode of combining the same, and the mode of employing, in combination, for building, paving, or any other purposes, any blocks, materials, or substances, of such form or shape.

Thirdly,—The application and introduction of iron or wooden rods, for the purpose of keeping the compound prisms, or a combination thereof, in a vertical position, and thereby strengthening the same.

Fourthly,—The application and introduction of stone or other materials, into the spaces of the peculiar mode of combination of compound prisms, when such spaces occur therein, whereby the sliding or slipping of animals, on the surface of any such combination, will be very much or altogether prevented.—[*Inrolled in the Inrolment Office, February, 1841.*]

Since the above specification was inrolled, the patentee has entered a memorandum of alteration, bearing date the 14th of February, 1842, for the purpose of more clearly explaining some parts which were rather indistinct in the specification. With respect to this memorandum, we fear the patentee has frustrated his own intention, for instead of elucidating the verbose and ill-drawn specification, he has, if possible, confused it still more. It appears, however, from what can be gleaned, that the chief alteration is in the treble rectangular prism, which is made of the form shewn in fig. 4, instead of that at fig. 3.

To HENRY PINKUS, Esq., of 36, Maddox-street, in the county of Middlesex, for an improved method of combining and applying materials, applicable to the formation or construction of roads or ways.—[Sealed 15th October, 1840.]

THIS invention consists in improved methods of constructing roads or ways, in order to facilitate the propulsion of vehicles thereon.

A foundation is first formed of rough close-set rubble-stones, placed on the ground, with their narrow ends upwards; the spaces between those ends being filled with small pieces of stone, rammed down, and consolidated by the application of grouting; or, instead of the foundation being composed of rubble-stones, it may be made of small stones, or of rough bricks. On this foundation, a number of buttress-sleepers, of the form shewn in Plate XI., at fig. 1, are laid parallel to each other, and to the line of road, constituting the abutments of arches of short span, into which the super-structure of the road is divided transversely.

The super-structure of the road is composed of wooden or stone blocks, either of the shape shewn in figs. 2 and 3, or of that shewn in figs. 4 and 5, which are formed into "textile or woven masses," by making circular or angular grooves *a*, in the sides of the blocks, in a line with their upper faces, and then laying them down in such a manner that the grooves of the adjacent blocks will meet, and form long, circular, or square grooves, in which rods *b*, are inserted, thereby strengthening and combining the whole together. Part of these rods lay at right angles to the line of road, and part are parallel to it, except when the blocks are laid diagonally with the line of road; then, in that case, the rods will cross the road diagonally, as shewn in fig. 5, in which the dotted line *c, c*, represents the line of road. The blocks form arches of short span, resting on the buttress-sleepers before mentioned; the blocks in contact with which conform to the bevilled form of the upper parts of the same.

In order that any part of the pavement may be removed with ease, key-blocks (see fig. 6,) are placed near the buttress-sleepers and curb-stones; they are formed by dividing one of the blocks into three pieces *d, e*, and *f*, the outer ones of which, *d, f*, are first laid down, and the wedge-shaped centre-piece *e*, is then driven between them.

To prevent horses or other animals slipping on pavements so constructed, a circular indentation is made in the upper surface of each block, as shewn at *g*, figs. 2, 3, 4, and 5, and filled with asphalte, mixed with coarse gravel or sand, or what is called artificial granite, or a hard burnt tile is inserted in each indentation.

Flag-stones, for side-walks or pavements, may be supported by rods, in a similar manner.—This mode of paving may also be used for forming tracks for tram or wheel-ways, tram-rails being let into the tracks flush with the surface of the road.

To facilitate the passage of carriages up inclined planes, on railways, a continuous sleeper is laid down in the centre of the line, the whole length of the inclined plane, and on it a rail *h*, fig. 7, is fixed, a vertical section of which is the frustrum of a cone: the ends of the rail taper to a point, as shewn at *i*. To the locomotive engine that draws the train, an adhesion apparatus is fastened, consisting of a frame *j*, in which two vertical shafts *k, k*, are mounted, carrying the pinions *l, l*, that take into and are driven by two bevil-wheels *m, m*, on the crank-axle *n*, of the engine, thereby communicating motion to two adhesion wheels *o, o*, on the lower ends of the shafts *k, k*, which work in contact with the sides of the rail *h*. The pressure of the wheels, *o, o*, on the sides of the rail, is regulated by a pair of levers *p, p*, attached to the frame *j*, by their axis or fulcrum *q*; the front ends of these levers are forked, and embrace the shafts *k, k*; so that, according as the outer ends of the levers are caused to approach or recede from each other, the shafts *k, k*, (which are moveable,) and consequently the adhesion-wheels *o, o*, will approach or recede from the centre rail. This is effected by the right and left-handed screw *r*, taking into the nuts *s, s*, attached to the outer ends of the levers *p, p*; the screw *r*, being turned in either direction by means of a double ratchet-wheel *t*, fixed on it, driven by the palls *u, u*, which are worked by a handle at *v*; thus, according to the direction in which the screw is turned, the outer ends of the levers will advance or recede from each other.

The revolution of the adhesion wheels, in contact with the centre rail, will assist the bite of the driving-wheels, and enable the engine to overcome the gravity of the load, when on the inclined plane. The adhesion wheels approach and roll upon each other after they have passed the termination of the centre rail.

The patentee also describes, in the specification of his patent, (the title of which, it should be borne in mind, is "an improved method of combining and applying materials, applicable to the formation or construction of roads or ways,") a mode of printing the times of the arrival and departure of trains from railway stations, and also the times of fast trains passing stations.—This is effected by attaching an index to the locomotive engine, which, acting on a stamping or printing apparatus, placed near the different stations, causes it to print the time on an endless paper band beneath the railway.

The patentee claims the improved methods of combining and applying materials in the construction of roads or ways.—[*Inrolled in the Rolls Chapel Office, April, 1841.*]

To COMTE MELANO DE CALCINA, of Nassau-street, for improvements in paving or covering roads and other ways or surfaces.—[Sealed 21st September, 1841.]

THE first improvement consists in paving or covering roads, &c., with wooden blocks, of a particular form, resting on longitudinal and transverse sleepers.

In Plate XI., fig. 1, is a perspective view; fig. 2, a side view of one of the improved blocks, provided with a tenon *a*; fig. 3, is a plan of some of the longitudinal and transverse sleepers that support the blocks; and fig. 4, is a transverse section of a road, paved according to this improvement.

The mode of paving with these blocks is as follows:—The ground having been made somewhat even, a longitudinal sleeper *b*, is placed at each side of the road, abutting against the curb-stone *c*; sleepers *d*, are then laid

across the road, extending from one longitudinal sleeper to the other, a sufficient space being left between them to receive the tenons of the blocks. These sleepers are composed of a number of pieces, according to the width of the road, and joined together in the manner shewn at *c*, their outer ends pressing against the longitudinal sleepers *b*.

The blocks are now laid down, their tenons being driven into the spaces between the sleepers *d*, and their shoulders *f*, resting upon the upper surfaces of those sleepers. The shoulders of the adjacent rows of blocks meet at the centres of the sleepers *d*, and the end blocks of each row, which abut against the sleepers *b*, are made of the form shewn at fig. 5.

The second improvement consists in fastening portions of the sleepers together, after the tenons of the blocks have been inserted between them, by means of bolts and nuts, so as to form large masses of blocks, to be used in paving, which may be laid down and removed with great facility.

The patentee claims, First,—The blocks, with tenons formed in one piece with them, or made separately and added to the blocks, such tenons being forced firmly between the sleepers on which the blocks rest.

Secondly,—The union of such sleepers, by bolts and screw-nuts or other fastenings, so as to form, when the blocks with their tenons are inserted, masses of blocks, of such dimensions as may be required.—[*Inrolled in the Inrolment Office, March, 1842.*]

To THOMAS PARKIN, of New Bridge-street, Blackfriars, engineer, for improvements in railroad and other carriages, in wheels for such carriages, and in roads and ways on which they are to travel.—[Sealed 9th April, 1839.]

THIS invention may be divided under four heads:—the first relating to carriages used on railways and common roads; the second to the construction of wheels for the same; the third to railways; and the fourth to paving common roads and ways with wood.

The first head comprises two improvements, the first of which is shewn applied to an omnibus, and consists in lifting the horse or horses from the ground when going down hill. For this purpose, the fore-wheels are placed as far forward as possible, in order that the weight of the horses may be counter-balanced by the weight of the body of the vehicle, from the front of which, a strong frame projects, above the horses, as far as their shoulders, carrying two horizontal axes, placed parallel to each other, and also parallel to the front of the coach. Upon each of these axes are four rollers or pulleys, and on the hind axis a worm-wheel is keyed, taking into a worm or endless screw, to which motion is communicated by the coachman, by means of a handle at the top of it. Over each of the four front rollers a rope passes, and is attached to the four hind rollers, to each of which, the ends of four other ropes are secured, the other ends of the ropes being fastened to two broad bands or girths, one under the belly of each horse; thus, by turning the endless screw, the ropes will be wound on the four hind rollers, and the horses, consequently, raised from the ground. The descent of the carriage is regulated by applying breaks to the fore-wheels.

The second improvement applies to carriages used on common roads and to railway carriages also, and consists in firmly fixing the fore-axle, so as to prevent any movement of the same, whilst the hind-axle is allowed to turn upon a centre-pin, being guided by the coachman, (when this improvement is applied to the carriages used on common roads,) by means of a lever and connecting-rods.

The second head contains four improvements:—the first relates to wheels for railway carriages, and consists in making the wheel out of twelve wooden sectors, (the grain of the wood radiating from the centre of the wheel,) the outer edges of which are fastened to the tire of the wheel, and their inner edges or points are secured by bolts, passing through them, and through two large metal bosses, which constitute the nave of the wheel; the opening for the axle-arm to work in, is formed after the wheel is made, by boring through the sectors and bosses.

The second improvement also relates to wheels for railway carriages, and is shewn in Plate XI., fig. 1, being a sectional view, taken through the wheel. *a, a*, are two metal bosses, which, together with the wooden ring *b, b*, between them, form the nave of the wheel; from these bosses a number of arms *c, c*, radiate, and between each pair of arms a hard wooden spoke *d*, is secured by the bolts *e, e, e*. *f, f*, are two wooden rings, forming the felloes of the wheel, and *g*, is the flanged tire.

The third improvement is shewn in fig. 2; it consists in making wheels, for travelling on common roads, with felloes of hard wood *h, h*, secured by bolts *k*, to the rib *i*, that projects from the outside of the metal felloe *j*;—a metal tire may be fastened on the felloes *h, h*, if desired.

The fourth improvement consists in constructing wheels for running alternately on railways and common roads.—Fig. 3, is a section of the wheel; *l*, is the nave; *m, m*, the

spokes; and *n*, the metal felloe, from the outside of which the metal tire *o*, projects, in order to bear the weight of the carriage, when running on common roads; the weight, when running on railways, being carried by the wooden felloe *p*, bolted to the tire *o*; the latter, in that case, acting as a flange, to keep the wheel from running off the rails.

The third head includes two improvements;—the first consists in forming the rails for railways of hard wood, placed upon a bed of concrete or gravel, with the grain of the wood in a vertical position; and the second in laying down tram-rails and edge-rails, in the same continuous line, for the wheel shewn at fig. 3, to travel upon, the tram-rails being laid down at the crossings of streets, and any other places it may be desired for the carriages to turn out at; and the edge-rails at the other parts of the line. The rails are supported by bearers of wood, laid upon continuous bearers of asphalte, or other suitable cement, the rails being laid down whilst the asphalte is soft, and secured by driving nails through them, and through the wooden bearers into the asphalte; the points of these nails are larger than their bodies, so that when the asphalte becomes hard, it will prevent them from being withdrawn.

Under the fourth head, eight improvements are classed; they consist, firstly, in paving with blocks of wood, the grain of which inclines to the horizon, at angles varying from 45° to 70°.

Secondly,—In paving with oblique or inclined blocks, dove-tailed together in pairs, the alternate rows of blocks leaning in opposite directions.

Thirdly,—In paving with blocks, studded with nails, in order to prevent horses and other animals from slipping.

Fourthly,—In paving with blocks or planks, connected together by inserting tongues or keys into grooves made in the sides of the blocks.

Fifthly,—In paving with blocks of various sizes, the grain of which stands in a vertical position, the blocks being cemented together, by filling the interstices between them with a mixture of sand, pulverized chalk, brick-dust, or other earthy matter, united with pitch or other bituminous substance. To separate these blocks, the cement is melted by means of a heated lever or coulter, and the blocks are then removed.

Sixthly,—In paving with blocks of wood, on a foundation of sand, ashes, or saw-dust, saturated with tar or other bituminous substance, and laid upon the ground for the blocks to rest on.

Seventhly,—In cutting furrows or grooves across the upper surfaces of the blocks of wood used in paving, (whether the grain is vertical, or inclined to the horizon,) for the purpose of preventing horses or other animals from slipping; the furrows being formed, when small blocks are used, by chamfering the outer edges of the blocks. The furrows may be made deep if required, and filled with gravel or asphalte.

Eighthly,—In laying down at the sides of streets, concave iron plates, fastened on longitudinal bearers of wood, to serve as gutters.—[*Inrolled in the Inrolment Office, October, 1839.*]

The patentee, in a disclaimer, dated April 27, 1841, wholly disclaims that part of the title of his patent, and the description in his specification, which relates to improvements in railroad and other carriages, including the mode of lifting horses; and with reference to the improvements in railways, all right to the mode of securing tram-rails or edge-rails upon wooden bearers, by driving nails through iron and wood into continuous bearers of asphalte, or other suitable cement. Also all right to the third im-

provement in paving; and with respect to the fourth improvement in paving, all right to paving with planks of wood, making grooves in the sides of the planks, and inserting tongues or keys in those grooves. Likewise, relative to the fifth improvement in paving, he disclaims the use of a heated lever or coulter; as also the seventh and eighth improvements.

To CHARLES SNEATH, of Nottingham, lace manufacturer, for certain improvements in machinery for the making or manufacturing of stockings or other kinds of loop-work.—[Sealed 23rd February, 1841.]

THESE improvements in machinery for manufacturing stockings or other kinds of loop-work, consist in a novel construction and arrangement of machinery, by which successive loops of thread or yarn are formed and connected together, so as to constitute a knitted fabric.

In Plate XI., fig. 1, represents a front elevation of the machine; fig. 2, a horizontal view, as it would appear when seen from above; and fig. 3, a vertical section, taken through the machine about the middle, at right angles to fig. 1.

A rectangular frame *a, a, a*, standing upon feet, supports the whole machinery; to the front rails of which, brackets *b, b*, and *c, c*, are attached, carrying the principal working parts;—*d, d*, a series of peculiarly-formed vertical jacks or levers, vibrating upon a horizontal shaft, between combs or partitions, fixed by lead or otherwise, in the brackets *c, c*.

To the upper end of each of these jacks, a lead, with two needles *e*, is connected by a joint, the needle-leads sliding out and in, horizontally, upon the top rail of the frame *a*;

and the lower ends of the jacks are severally acted upon by springs *f, f, f*, which, by pressing against the tails of the jacks, force their lower ends back, and thereby cause the needles to be projected forward, as shewn in the vertical section, fig. 3.

A horizontal shaft, mounted in bearings upon the side rails of the frame, extends through the middle of the machine; parallel to the front, carrying the barrel or cylinder *g*. On the periphery of this cylinder is fixed a series of cams or tappets *h, h, h*, set as oblique steps, which steps act severally upon the tail parts of the jacks, as the cylinder revolves, for the purpose of drawing back the needles, at the required periods, one after another.

The bobbin, containing the yarn or thread, for the production of the fabric, is placed in any convenient situation above the machine, from whence the thread passes down through the eye of a guide or thread-carrier *i, i*, to the needles. This thread-carrier is made to travel to and fro over the series or horizontal range of needles *e*, by means of a lateral cam *k*, at the end of the cylinder.

The guide *i*, is attached to a bar *l*, which bar slides horizontally in slots, in two standards *m, m*, fixed to the front top rail of the frame *a*, as shewn in fig. 1. The end of the bar *l*, is connected by a joint to a vertical lever *n*, vibrating upon a fulcrum-pin *o*, set in the face of the frame-work; and the lower end or shorter arm of this lever carries a stud *p*, which is kept bearing against the face of the rotary cam *k*, by a helical spring *q*.

From the front ends of the brackets *b, b*, a lever-frame *r*, is suspended by joints; which lever-frame carries a bar *s*, and to this bar is attached a series of points *t, t*, set into leads, (see fig. 1.) These points stand between the needles, and are for the purpose of forming the loops, instead of the sinkers of an ordinary stocking-frame. At the back part

of this lever-frame *r*, a tail-lever *x*, is affixed, which is raised at certain periods by the cam *v*, set in a rotary shaft *w*, for the purpose of depressing the points. Also to the front ends of the brackets *b*, *b*, two other levers are attached by joints, which may carry a presser-bar *x*; and at the back of this bar, there is a tail-lever *y*, acted upon by a cam *z*, set in the rotary shaft *w*, which raises the presser-bar at certain periods. To the under parts of the brackets *b*, a vertical bar *j*, is affixed, the top edge of which is cut into notches as a comb,—it is called the stump-bar; and between these notches the needles slide to and fro. In front of this bar, below the needles, a thin plate, called the freeing-bar, is attached, leaving a space between the two for the work to pass down to the work-beam below, as seen in the section, fig. 3.

It will be perceived, that the drawings represent a double machine, that is, a frame containing two sets of working parts, designed to produce two fabrics at one time; the one set of working parts being situate in front, as shewn in fig. 1,—the other, perfectly corresponding in all its features, being situate behind, at the opposite or back of the frame. But, as the forms and arrangements of the mechanical parts of each set are the same, it will be sufficient to describe the operations of one set of the machinery only.

In order to actuate this machine, rotary motion is to be given to the driving shaft *A*, which may be by a handle or pulley and band from a steam-engine or other first mover, when a pinion, fixed upon that shaft, taking into a toothed-wheel upon the shaft of the barrel *g*, will give rotary motion to the barrel and its cams *h*, *h*, *h*; and the same pinion also taking into another toothed-wheel, on the shaft *w*, communicates rotary motion to that shaft and its cams *v*, and *z*, and hence actuates all the working parts of the machine.

Let it now be supposed that the machinery, as described and shewn in the drawings, is ready for work; the thread or yarn, from the bobbin above, passing down through the guide *i*. The rotation of the driving-shaft *Λ*, may be considered, in the first place, to have turned the shaft *w*, so that its cam *v*, shall be passing under the tail *u*, of the lever-frame *r*, and thereby have raised the bar *s*, and have brought the points *t*, up between the needles; the lower edge of the presser-bar *x*, at this time bearing upon the stems of the needles. The lateral cam *k*, on the end of the cylinder *g*, now begins to act against the stud *p*, and produce such vibratory movement of the lever *u*, as to cause the sliding-bar *l*, to conduct the guide *i*, across the machine over the range of needles *e*, and thereby to lay the thread across the machine, upon the tops of the needles.

Whilst the guide *i*, with the thread, is thus passing, the step-cams *h*, *h*, *h*, fixed upon the periphery of the cylinder *g*, successively come into operation against the lower ends or tails of the several jack-levers *d*, causing the jack-levers, one after another, to draw back the several needles *e*; by which movement of the needles, the thread is brought under their beards; and as the needles recede further, the extended thread is drawn in loops round the front parts of the points *t*, *t*, *t*.—These loops, thus formed on the points *t*, *t*, *t*, are to constitute a row of stitches or loops, of the fabric about to be produced; but, as it must be understood that a previous row of stitches have been laid round the stems of the needles, (as in the ordinary mode of setting on,) the beards of the needles, in passing under the presser-bar, are depressed, so as to allow the previously-formed stitches to slide over the beards to the ends of the needles; and the loops, last formed under the beards, to be drawn through the stitches, which is done by a greater elevation of the cam *h*, as it revolves, drawing further back all the jack-levers and needles collectively.

By this time the cam *v*, (see fig. 3,) will have so far passed onward as to allow the tail *u*, and lever-frame *r*, to descend and bring down the point-bar *s*, and points *t*, by which the loops of thread will have slipped off the ends of the points, and, by the ultimate receding of the jacks, be brought on to the stumps on the top edge of the bar *j*.

The presser-bar *x*, is now raised by the rotary cam *z*, passing under the tail *y*; and the cams *h*, on the rotary cylinder *g*, having advanced beyond the tails of the jack-levers *d*, the springs *f*, cause the jacks to project all the needles forward together, ready to commence another course.

In narrowing the work for shaping the stocking or other article, the stitch must be lifted from the outside needles on to the next, which may be done by any of the means at present known, and commonly practised. The needles, thus put out of use, may then be removed from the jack-lever, if required; and in order to do this, instead of attaching the needle-leads to the jack-levers, by a permanent rivet, they may be connected in the way shewn in the auxiliary figs. 4, 5, and 6.

Fig. 4, represents the upper part of a jack, with the hole or eye for the connecting pin to pass through; *a*, is a piece affixed to the side of the jack, having a counter-sunk edge. Fig. 5, represents the detached needle and its lead, with the small stud fixed in it, which is to pass into the eye of the jack, and form the joint; the end of the lead being bevilled at *b*. In connecting the needle-lead to the jack, it is placed in the upright position shewn at fig. 7; and when the stud has passed into the eye of the jack, the lead is brought down into the position shewn by dots, the bevilled end *b*, passing under the counter-sunk edge of the piece *a*, by which it is kept securely attached.

The form of stump-bar *j*, which is employed instead of

the ordinary sinkers, is represented in two detached positions, at figs. 7 and 8. Fig. 7, is a transverse section of the bar, and fig. 8, is a front view of the same.—[*Inrolled in the Petty Bag Office, August, 1841.*]

Specification drawn by Messrs. Newton and Son.

To JOHN DEAN, of Dover, in the county of Kent, chemist, for his invention of improvements in preparing skins and other animal substances for obtaining gelatine, size and glue, and in preparing skins for tanning.—[Sealed 23rd February, 1841.]

THE process of manufacturing gelatine, size, and glue, from skins and other animal substances, such for instance as the tendons of the feet, is as follows :—

After these substances have been deprived of their horns, hoofs, and fatty matters, they are placed in a solution of lime, or of the alkalies, potass or soda, diffused in water, in the proportion of 8 to 26 lbs. of lime, and from 4 to 16 lbs. of potass or soda to every 50 gallons of water, for the purpose of removing all hair from the hides; and in this solution they are allowed to remain not less than 24 hours, by which time the hair will be slightly loosened. The animal substances, together with a quantity of the same, or a similar solution, are then placed in a rotating cylinder, constructed like the figures in Plate XI.; fig. 1, being a longitudinal section of the cylinder, mounted in proper bearings in the frame-work, and fig. 2, a vertical section.

The cylinder is formed of bars of wood or suitable metal, set at short distances apart, and secured to strong circular ends, of from two to four feet in diameter. Some of these bars must be moveable, to allow of the admission of the skins, &c. A perforated surface of wood, secured in a

similar way to the bars, may be adopted; in which case a door must be made for the admission of the skins.

The cylinder is made to revolve, (by the agency of any required mechanical or manual power, in a case, vat, or trough, of any suitable material,) until, by the action of the lime, or the alkalies, potass or soda, assisted by the friction of the internal surface of the cylinder, and the animal substances rubbing against each other, the hair becomes removed, together with some of the albumen which such animal substances contain. The hides, skins, or pieces, thus treated, are then taken out of the cylinder and cleansed, fleshed, or shaved in the ordinary way, and washed and soaked in water until thoroughly cleansed.

The hides, skins, or pieces, thus prepared, or the animal substances, such as the tendons which do not require un-hairing, are then steeped in a large or suitable vat or tank, and allowed to remain in water until a slight putrescence is evident. They are then placed in suitable receivers, constructed either of wood or metal, or some vitrified substance, as glass or earthenware, and covered with water, and upon them is poured from 6 to 28 or 30 lbs. of hydrochloric acid for every 100 lbs. weight of animal substance that the receivers contain; or the hydrochloric acid, in either of the above-mentioned proportions, may be combined with a sufficient quantity of water, in a separate suitable vessel, and poured upon the hides, or skins, or other animal substances, and stirred round, in order to give the mixture access to all parts of their surface. The vessel is then covered over, and the animal substances are exposed to the action of the acidulated water for a suitable time, varying according to the kind and age of the skins, hides, and animal substances, from eight to twenty-four hours. The hides and pieces of the buffalo and other animals, when of unusual bulk or thickness, will require to be again exposed

to the action of a similar solution, and in that case it would be desirable to wash them carefully before such re-exposure. When the skins and animal substances have been sufficiently exposed to the action of this mixture, they assume generally a whitened semi-transparent appearance.

The hides, skins, pieces, and animal substances, next require to be washed thoroughly in clear cold water; and in order to do so effectually, a rotating cylinder, such as before described, may be used, but stampers will answer the same purpose; in any case the washing should be continued until the water passes through them perfectly clear and limpid.—This washing being completed, the animal substances are deposited in a tun, vat, or tank, accessible to a constantly flowing current of clear fresh water, which is allowed to cover them, and in which they may remain one, two, or three days, when they are ready to have their gelatine, size, or glue, extracted from them.

Hides or skins, intended to be tanned, must be submitted to a process like to the one before described, in order to deprive the hides and skins of their hair; namely, by the assistance of a rotating cylinder and a solution of lime, or the alkalies, soda and potass; and also a similar process is made use of by the application of the hydrochloric acid, or the acid solution, the proportions, in either case, being the same, and dependent upon the same circumstances. When these processes are completed, the hides and skins are ready to be manufactured into leather, by being exposed to or operated upon by the tanning principle or tannin in the ordinary way.

The patentee claims, first, the use of a rotating perforated or other cylinder, as before described, for the purpose of unhairing the skins, or hides, or pieces, to be used in the manufacture of gelatine, size, or glue, when used in combination with a solution of lime, potass, or soda, or

combined portions of either; secondly, the application of hydrochloric acid or hydrochloric acid gas, or hydrochloric acid or hydrochloric acid gas diffused in water, in whatsoever manner it may be employed, when applied to hides, skins, or other animal substances, for the purpose of preparing them for the manufacture of gelatine, size, or glue; and thirdly, the sole application of the above-mentioned acid and acid gas to hides and skins, for the purpose of preparing them for being tanned.—[*Inrolled at the Petty Bag Office, August, 1841.*]

Specification drawn by Messrs. Newton and Son.

To DAVID NAPIER, of Mill Wall, in the county of Middlesex, engineer, for improvements in propelling vessels.
—[Sealed 22nd March, 1841.]

THE first improvement consists in removing the paddle-wheels from the sides of steam vessels, and placing two wheels of equal diameter, with oblique float boards, at the stern, their shafts lying parallel with the length of the vessel, and the wheels consequently working at right angles to the direction in which the vessel is going. One wheel is placed further aft than the other, so as to admit of its float boards working nearly up to the shaft of the other wheel, without interfering with the float boards of that wheel.

The second improvement is intended to avoid the lifting of back water by floats of the paddle wheels. It consists in mounting the floats on short axles, with a crank at one end, from which a heavy metallic frame is suspended; this frame, by its weight, keeps the floats always in a vertical position, and thus prevents their lifting any back water, as the paddle-wheel revolves.—[*Inrolled in the Inrolment Office, September, 1841.*]

To JOHN LINDSAY, ESQ., of Lewisham, in the county of Kent, for improvements in covers for water-closets, night stools, and bed pans.—[Sealed 29th March, 1841.]

THIS invention consists in a mode of making the covers of water-closets, &c., so as to prevent the escape of any unpleasant effluvia.

The cover is made of a circular piece of mahogany or other wood, with a hole in the centre to receive a peg, and is bound round its outer edge with woollen cloth or other elastic substance, covered with a strip of chamois leather. In using this cover, it is pressed down in the pan, the hole in the centre permitting the air in the pan to escape; and when the cover is low enough, the hole is closed air-tight by the peg, and the escape of any effluvia prevented.—[Inrolled in the Inrolment Office, September, 1841.]

To ANTHONY THEOPHILUS MERRY, of Birmingham, refiner of metals, for an improved process or processes for obtaining zinc and lead from their respective ores, and for the calcination of other metallic bodies.—[Sealed March 22nd, 1841.]

THIS invention consists in applying the heat arising from the converting of pit-coal into coke, to the purposes of calcining, roasting, and smelting the ores of zinc and lead. To accomplish this, the coke-oven is connected at the back, by a flue, with a subliming furnace; from the back of which a flue leads to a reverberatory furnace, and from the back of this furnace another flue proceeds to a chimney. The subliming pots are twenty-four in number, and their

lower ends are inserted into condensing pipes, which dip into vessels containing water, to receive in drops the condensed vapours of the zinc.

The ores of zinc (*i. e.* the carbonate and sulphuret of zinc) are, in the first instance, converted into an impure oxide of zinc, in the following manner:—The carbonate of zinc, after being reduced to a coarse powder and washed, is exposed in a reverberatory furnace, for five or six hours, to a strong red heat, (being occasionally stirred with an iron rake,) which decomposes the carbonate, and produces an impure oxide of zinc.

The sulphuret is coarsely pulverized, and washed, and calcined for twenty-four hours, in a reverberatory furnace, being stirred every half-hour. During the first six hours it is exposed to a very low heat, which, for the remainder of the time, is increased to a strong red heat; and at the end of the twenty-four hours, the sulphuret will be decomposed, and an impure oxide of zinc produced.

The following is the mode of converting the impure oxide of zinc into a metallic state:—A fire is first made in the coke-oven, and small quantities of coal are added, until the subliming pots are made red hot by the flame, heated gases, &c., that pass from the coke-oven into the subliming furnace, and from thence proceed through the reverberatory furnace into the chimney. The oven is then cleared out, and charged with the coal to be made into coke; and at the same time the subliming pots are charged with the oxide of zinc, mixed with pulverized charcoal, coke, or other carbonaceous substance, in the proportions of one part, by weight, of charcoal, to three parts of the oxide; the opening at the bottom of each subliming pot being stopped up by a piece of coke or charcoal, to prevent the charge from passing through.

In about twenty-four or thirty hours, the coal will be

converted into coke, the ore in the subliming-pots reduced, and the zinc sublimed. The sublimed zinc is then collected, and the subliming pots and coke-oven are cleared out and re-charged; after which the above process is repeated.

The flame, heated gases, &c., from the coke-oven, may pass through a calcining furnace, in the same way as they pass through the subliming furnace.

An ordinary smelting furnace is employed for smelting lead ores, it being connected, by a flue, with a coke-oven, in the same manner as the subliming furnace, and for the same purpose.

The patentee claims the application of the heat, arising from the carbonization of pit-coal, to the calcining, subliming, or smelting the ores of lead or zinc, let the apparatus or process, combined therewith, be what it may; and likewise the combination of furnaces for the calcination of the ores of other metallic bodies, besides those of zinc and lead.—[*Inrolled in the Inrolment Office, September, 1841.*]

To JOSEPH BETTRIDGE, of Birmingham, wood turner, for an improved method of manufacturing papier-maché, pearl, china, ivory, horn, wood, and compositions, into pillars and stands, for table and other articles of domestic furniture.—[Sealed 27th May 1841.]

THIS invention consists in manufacturing the pillars and stands of table and other lamps, the poles and rings for curtains, and also cornices, out of stove-dried wood, ornamented with papier-maché, pearl, china, &c.

The mode of making pillars for lamps, according to this invention, is as follows:—A piece of well-seasoned wood is selected, and turned in a lathe into a rough representa-

tion of the intended figure of the pillar, and a hole is bored through it lengthwise; it is then placed in a japanner's stove, and exposed, for a period varying from seven to ten days, to a heat beginning at 120° Fahr., and increasing to 250°. At the end of this period it is removed from the stove, and finished in a lathe; after which, it is ornamented by japaning, carving, or inlaying ornaments of papier-maché, pearl, china, ivory, &c.

The plinth of the pillar is made in the same manner, and from the centre of it a wire rises, which, passing through the hole in the pillar, is secured at its upper end by a nut, and thus the plinth is firmly attached to the pillar.

The patentee claims the method of manufacturing pillars and stands for lamps, by applying stove-dried wood, as described, either ornamented or not, by the application of papier-maché, pearl, china, ivory, horn, or compositions; likewise the mode of manufacturing cornices, poles, and rings, of stove-dried wood, as described.—[*Inrolled in the Inrolment Office, November, 1841.*]

To JAMES COLLEY MARCH, of Barnstaple, in the county of Devon, surgeon, for certain improved means of producing heat from the combustion of certain kinds of fuel.—[Sealed 8th June, 1841.]

THIS invention is intended to facilitate the combustion of all kinds of coal, (anthracite only excepted,) and consists in causing a stream or streams of air to impinge on the upper surface of the ignited coal, instead of the air being admitted from below, and passing upwards through the general mass of fuel contained in the fire-place or furnace.

It may be applied to all kinds of furnaces, but the follow-

ing description of its application to the furnace of a stationary steam-boiler, will be sufficient to illustrate the improvement:—The furnace is divested of its fire-bars, and beneath it a receptacle for coals is formed, having a moveable bottom, on which the coals rest; from the underside of this bottom plate two racks descend, taking into two pinions, on a horizontal axis, which being turned by means of a handle, as the upper part of the coal is consumed, causes the bottom plate to rise, and so keep the fire well supplied with fuel. The air passes through a large pipe in front of the boiler, into a series of horizontal tubes within the boiler, from whence it is conducted by a number of vertical tubes into the furnace, and is caused to impinge on the upper surface of the ignited coal. These tubes may be enclosed in other tubes, if desired, in order to prevent the air from becoming heated in its passage through the boiler. —[*Inrolled in the Inrolment Office, December, 1841.*]

*DESCRIPTIONS OF THOSE PATENTS GRANTED IN 1834,
WHICH HAVE NOT BEEN REPORTED IN THIS JOURNAL.

To JANET TAYLOR, of East-street, Red Lion-square, in the county of Middlesex, for improvements in instruments for measuring angles and distances, applicable to nautical and other purposes.—[Sealed 27th March, 1834.]

THE improved instrument is shewn in Plate XII., at figs. 1, 2, 3, 4.—Fig. 1, being an elevation in perspective, and

* Since the commencement of this work, established in 1820, with the view of bringing into public notice all inventions patented in England, every branch of manufacture has so much increased, not only by the energy of our own countrymen, but by the protection held out to all foreigners, that the yearly number of patents has augmented in a ratio which could not have been calculated upon. The task, therefore, of reporting each invention, which was once considered practicable, is now impossible to accomplish, although from time to time the size of the work has been considerably increased. The editor's intention in reporting the following specifications, is to make the work complete, as to the description of all patents, up to a certain time, previous to publishing a second analogical index, which has been anxiously enquired after by many subscribers, and is now in a state of considerable forwardness.

fig. 2, a plan of the instrument; figs. 3 and 4, are separate views of some of the parts.

The instrument consists of a semi-circular graduated scale *a*, fixed on the top of a ring *b*, in such a manner, that the centre of the circle, of which it is the half, is in a right line with the poles of the ring *b*; and to these poles also the handle *c*, by which the instrument is held, when taking observations, is fixed. *d*, is a semi-circular graduated scale, hinged or jointed to the poles of the ring *b*, and consequently capable of assuming any angle thereto; and *e*, is a semi-circular stay to the ring *b*, within which the scale *d*, moves; *f*, is an indicator, turning on a centre at *g*, and having in its outer end an oblong rectangular opening, through which part of the scale *a*, can be seen;—it is connected by a piece of brass *h*, with the scale *d*, so that they may both move together, in order that the graduated scale *i*, *j*, on the indicator *f*, may determine the angle formed by any movement of the scale *d*, with the ring *b*; and the indicator is steadied in its movements by a strap, at its outer end, which embraces the edge of the scale *a*.—*k*, is a tangent-screw, and *l*, a clamp or set-screw.

Upon the upper part of one-half of the ring *b*, shewn detached at fig. 4, is a graduated scale, commencing at the point *m*, with 0, and ending at the point *n*, with 90° ; and in a groove in this part of the ring *b*, a nonius *o*, slides. The scale *a*, is graduated into three scales *p*, *q*, *r*; the scales *p*, *q*, commencing, respectively, at 0, in the middle of the scale *a*, and ending at 180° at the points *p*, *q*; the scale *r*, commences with 0, at the point *r*, and ends with 180° at the point *s*. The scale *c*, is graduated in two directions, beginning at *t*, with 0, and ending with 90° at *u*, *v*; and in a groove in the scale *c*, a nonius *y*, slides. The scale *i*, *j*, on the indicator, corresponds with the scale *r*, and the scale *w*, *x*, with the scales *p*, *q*.

The instrument is provided with glasses, for taking observations, so as to render the ordinary quadrant and sextant unnecessary.

The mode of ascertaining the hour-angle, at any time of the day, is as follows, supposing the latitude to be $51^{\circ} 32'$ north, and the declination of the sun $28^{\circ} 23'$ north:—The nonius *o*, is first moved along the groove in the ring *b*, until its point 0, is opposite $51^{\circ} 32'$ on the scale *m*, *n*; and then the nonius *y*, is moved along the groove in the scale *d*, till its point 0, is opposite $28^{\circ} 23'$. The altitude of the sun is

now taken in the usual manner, and measured off by a pair of compasses on the scale *d*, and that scale is then moved to such a position, that the compliment of the altitude taken by the pair of compasses, will be equal to the distance between the two degrees marked on the graduated scales *b*, *d*; so that one point of the compasses being placed against $51^{\circ} 32'$ on the ring *b*, the other point will touch $28^{\circ} 23'$ on the scale *d*. The indicator *f*, which, as before mentioned, accompanies the scale *d*, in its movements, is now fixed by the set-screw *l*, and at the point 0, on the scale *i*, *j*, the required hour will be found.

The following is the mode of finding the distance between two given points, supposing the difference of longitude between the two to be $11^{\circ} 6'$, and their respective latitudes $49^{\circ} 58'$ north, and $33^{\circ} 3'$ north:—The indicator *f*, is first fixed by the set-screw *l*, at $11^{\circ} 6'$ on the scale *r*, and then the nonius *o*, is moved to $49^{\circ} 58'$ on the ring *b*, and the nonius *y*, to $33^{\circ} 3'$ on the scale *d*; the distance between these two last points, is the distance required, which, being taken by a pair of compasses, and measured off on the scale *c*, will be found to be $18^{\circ} 48'$.

To ascertain the difference of longitude, the noniuses are set to the two latitudes, as above, and the distance between the two places, (*i. e.* $18^{\circ} 48'$) taken by a pair of compasses; the scale *d*, is then moved, until the points of the compasses touch the points 0, on the two noniuses, and the indicator being then fixed by the set-screw, the difference of the longitude will be found on the scale *a*, opposite the point 0, on the scale *i*, *j*.

The patentee claims the giving to the scale *d*, the property of assuming any angle with reference to the scale *m*, *n*, on the ring *b*, when the same is combined with the scale *a*, and used for the purpose of ascertaining or measuring angles and distances, as described.—[Inrolled in the Inrolment Office, September, 1834.]

To WILLIAM GITTINS, of the parish of St. Pancras, in the county of Middlesex, Esq., for an improved mode of applying the water, used for the purpose of condensation in marine and certain other steam-engines, to the condenser.—[Sealed 6th May, 1834.]

THIS improvement consists in placing a condenser or condensers, at the outside of the steam-boat or vessel, so that

they shall be immersed in the water in which the vessel floats, and be thereby kept cool enough to condense the waste steam admitted into them from the cylinders of the steam-engines, or from the ordinary condensers.

These additional condensers are made of thin metal plate, being of a curved form, corresponding with the curved sides of the vessel, to which they are secured by stay-bolts; and expose large lateral surfaces, parallel to the sides of the vessel, in order that the steam, which is conveyed into them, may be spread out in thin sheets, and effectually exposed to the cooling action of the circumjacent water. A narrow space is left between the condenser and the side of the vessel, for the passage of a thin sheet of water, to keep the side of the condenser next the vessel cool. The water, produced by the condensation of the steam, is drawn off from the bottoms of the condensers, through drain-pipes, by the ordinary air-pumps of the engines.

The condensers may, if desired, be formed of a series of curved tubes, placed in a vertical position, and connected with each other at their ends.—[*Inrolled in the Inrolment Office, November 6th, 1834.*]

To ALEXANDER BEATTIE SHANKLAND, of Egremont-place, in the parish of St. Pancras, in the county of Middlesex, for a machine or engine for cutting or fashioning wood into certain defined shapes or forms, to fit the same more readily to various purposes and uses.—[Sealed 6th May, 1834.]

THIS machine is described, in the specification, as applied to cutting and forming wood into spokes for the wheels of carriages, and consists of a strong frame, on the top of which a table or platform is fixed, with apertures in it for the different saws and cutters used in the machine. Directly beneath this table a horizontal axis extends across the machine, carrying on one end of it a pair of circular saws, by which the timber is reduced to its proper size, and on the other end of it a cutter-wheel, for dressing the edges of the timber; the centre of the axis is occupied by a tenon cutter-wheel, by which the tenon is formed on the end of the spoke. The cutter-wheels are circular discs of cast-iron, about fifteen inches in diameter, and three inches

and a half in thickness at their periphery, which is grooved to admit the work. The periphery of the tenon cutter-wheel is morticed or notched in four or more places, to receive the cutters or blades, which are fixed in the mortices by screws or wedges, their edges projecting beyond the mortices, after the manner of fixing plane-irons. The blades belonging to the other cutter-wheel, are, by preference, made out of a bar of steel, bent at the cutting part to the desired form, and sharpened by a bevil, from the outside of the curve, so that the cutting form of the tool does not change by wear. This blade is fixed on the periphery of the cutter-wheel by a screw at each end, the bend dropping into the groove of the wheel; and if it is desired that the back and front sides of the spoke should be dressed to different curves, it will be necessary to have two wheels for that purpose, or one broader wheel, with two grooves in its periphery, and two sets of cutters, of the different curves required.

Beneath the cutter-wheels is a sliding table, moving in the direction of the length of the machine, by which the spoke is carried under the cutter-wheel that dresses its edges.

The following is the mode of operation:—The “quartering” being laid on the table first-mentioned, is squared and brought to the proper dimensions by the circular saws, which are caused to revolve, together with the cutter-wheels, on the same axis, and the tenon is then formed, by bringing the end of the piece of timber up to the blades on the tenon cutter-wheel. The spoke is now removed, and fixed on the bed of the sliding-table, its front end being adjusted to its proper height by a wedge, and pressed against a pin, by a screw and winch, at the tenon end, in order to keep it steady. The table now moves forward, carrying the spoke under the cutter-wheel, on the end of the axis; and when the angles on one side are dressed, the carriage is moved backward to its first position. After the spoke has been turned, the carriage again moves forward, carrying the spoke under the same cutter-wheel, or under a different one, if the forms of the two sides of the spoke are to differ.

The patentee claims the combined machinery herein described, and especially the apparatus for dressing down the angles of the timber, whether the several parts are

arranged, connected, and moved, precisely in the manner now set forth, or modified in various ways, to produce the same results.—[*Inrolled in the Inrolment Office, November, 1834.*]

To LOUIS BRUNIER, of Vineyard-walk, in the parish of Clerkenwell, in the county of Middlesex, architect and civil engineer, for an hydraulic machine or apparatus, of a centrifugal force, applicable to the raising or forcing water.—[Sealed 8th May, 1834.]

THIS invention consists in an apparatus for raising a column of water above its ordinary level, by means of the centrifugal force which water acquires when caused to rush in a circular direction.

In Plate XII., fig. 1, is a transverse vertical section of the machine; and fig. 2, an enlarged plan, in section, of that part called the channel-box. The machine consists, in the first place, of a flat circular box or case *b*, called the channel-box, the interior of which is divided into five circular channels *c, c, c*, communicating with what the patentee calls the channel-neck *d*, by the five passages *e, e, e*; the bottom of each channel *c*, is an inclined plane, rising from where it joins the bottom of the channel-neck, until it arrives at the channel-neck again, when the incline ceases, (being then level with the top of that neck,) and the flat top of the channel-neck forms the remaining portion of the bottom of the channel *c*. The partitions or divisions that form the sides of the channels *c*, are each pierced with eight openings, like port-holes, which are nearly as deep as the partitions are over the channel-neck, and radiate from the centre of the channel-box; the openings in the inner partition being square, and becoming more and more oblong in each succeeding partition. The vertical sides of each port-hole are angular, forming a tangent to the circular channels *c*, in the direction of the motion of the water, so as to facilitate its exit through the port-holes; and the partitions between the port-holes are perforated with a number of small holes.

The channel-box *b*, has a number of exit pipes *f*, each provided with a conical end, out of which the water escapes, and passes through a conical hole in the caps *g*, into the

ascension-pipes *h*. These pipes *h*, terminate in a tank *i*, into which the water is to be raised from the reservoir *j*, and be thence conducted by the spout *k*, to any place desired; or if power is required, the water may flow from the spout on to a water-wheel, and then fall back again into the reservoir *j*; the wheel being stopped, when required, by raising the valve *l*, by means of the cord *m*, passing over the pulleys *n, n, n*, and so causing the water to run through the pipe *o*, into the reservoir, instead of running through the spout *k*.—*p*, is a trough or passage that conducts the water into the channel-box *b*, and is opened or closed by the valve *q*, which is raised or lowered by means of the rods *r, r*, fastened to the end of the lever *s*; this lever being acted on by the attendant through the handle *t*.

The action of the machine is as follows:—The valve *q*, being opened, the water is admitted through the trough *p*, and channel-neck *d*, into the circular channels *c, c, c*, from whence it rushes through the exit-pipes *f*, into the ascension-pipes *h*, with sufficient force to fill those pipes, and flow over their upper ends into the tank *i*.

The patentee claims, as his invention, the hydraulic apparatus herein described, whereby he is enabled to apply the centrifugal force acquired by a column of water, when allowed to rush into a circular channel, in a direction forming a tangent with that channel, to raise water above the level of the said column.—[*Inrolled in the Inrolment Office, November, 1834.*]

To CHARLES LOUIS STANISLAS BARON HEURTELOUP, of Holles-street, Cavendish-square, in the county of Middlesex, for improvements in certain parts of certain descriptions of fire-arms.—[Sealed 22nd May, 1834.]

THE first part of this invention consists in fitting-up the stock, lock-plate, and hammer of a musket or other fire-arm, in such a manner, that a small tube of soft metal, containing the priming, may be brought forward to the touch-hole, and a piece separated from it and exploded by the fall of the hammer.

In Plate XII., fig. 1, is a side view of the stock and part of the barrel of a fowling-piece, with this improvement applied to it; and fig. 2, is a plan of the mechanism, by which the priming tube is moved towards the touch-hole.

A hole is bored in the butt-end of the stock, from *a*, to *b*, to receive the priming tube *c*, which is a soft metal tube filled with detonating powder; from *b*, the tube proceeds through the cavity made for the lock till it reaches the guide nipple *d*, through which it passes to the touch-hole *d*, its end resting on a ledge or shelf *e*. The end of the hammer is forked, so as to bestride the guide-nipple when it falls; and over the fork, the full width of the head of the hammer, a steel blade or knife *f*, extends. *g*, is a piece of steel called the striking piece, fastened on the head of the hammer by the screw *h*, which passing through the blade *f*, secures that also.

The hammer in falling, describes the arc, shewn by dotted lines, and its forked end passes beside the guide-nipple, whilst the blade *f*, above, cuts off a small piece from the end of the priming tube, which piece is caused to explode by the striking-piece *g*, coming in contact with it, the explosion communicating fire to the touch-hole; the blade *f*, at the same time, covering the hole at the end of the guide-nipple *d*, and thus preventing the explosion of the remainder of the priming.

The arrangement of mechanism for pushing the priming tube towards the touch-hole, is as follows:—*i*, fig. 2, is the arm on which the hammer is fitted; *j*, is a ratchet wheel of six teeth, with a milled boss *k*, beneath, turning on a centre *l*, firmly fixed to the solid piece *m*, of the lock-plate, the boss being let into the solid piece. *n*, is a spring paul or catch to secure the ratchet-wheel from moving, except in the direction of the arrow, and that only when required. *o*, is a spring, with a friction roller *p*, at the end of it, which presses the priming tube, as it passes through the solid piece, against the milled boss, so as slightly to indent the tube, and thus give the boss sufficient hold of it to force it forward when the ratchet wheel *j*, is turned round. The ratchet wheel *j*, is turned round by means of a spring, fixed to the side of the hammer next the ratchet wheel, the end of which spring, when the hammer is down, takes into the teeth of the ratchet wheel, and on the hammer being raised, turns the same round one tooth, but no more, for as soon as the hammer has reached half-cock, the spring will be withdrawn from the teeth of the ratchet wheel, which is prevented from running back by the spring paul *n*.

The second part of the invention consists in an improved

mode of loading fire-arms at the breech. Fig. 3, is a side view, partly in section, of the barrel and stock of a double-barrelled fowling piece; and fig. 4, is a plan of that part of the stock in which the breech end of the barrels rest, and by its peculiar construction the barrels may be moved backwards and forwards. The arrangement which constitutes the first part of the invention, is not shewn in either of these figures, in order to avoid confusion; but it may, nevertheless, be used with the second part. Instead of a hut being formed on the plug at the butt-end of the barrels, as usual, two huts *q*, *r*, are formed on the solid central piece between the two barrels, and through an oblong hole in the hut *q*, a fulcrum pin *s*, is introduced: *t*, is a round stud, the use of which will be explained hereafter; and *u*, is a steadying or guide-pin.

To load the barrels at the breech, they are, in the first instance, moved away from the break-off, and the plugs *v*, *v*, and their breech ends are then tilted up, turning on the fulcrum pin *s*, in order to receive the cartridge *w*, (shewn separately in fig. 5,) which is made with a cup of wood or lead *w**, next the plugs *v*, *v*, and bored to receive a short piece of the priming tube. The barrels are then brought down upon the stock, and moved backwards to the plugs *v*, *v*, which not only completely close the ends of the barrels; but, by this backward movement, ram the cartridges tightly in the same.

The arrangement by which the barrels are moved backwards and forwards, is a lever movement, the lever used being the trigger guard *x*, which is fastened on the lower end of a plug *y*. The upper part of this plug is formed into an excentric *y**, and has a hole *z*, in it, to receive the stud *t*.

When it is desired to move the barrels away from the plugs *v*, *v*, the trigger guard is pushed on one side, till it stands at right angles to the stock; by which means the plug *y*, is turned round, carrying with it the stud *t*, and consequently moving the barrels forward. When the barrels are to be moved back again, the trigger guard is drawn backwards, and by so doing, the excentric *y**, on the plug *y*, is caused to act on the hut *r*, and push the barrels backwards, until the side *z**, of the hole in the plug, acts upon the stud *t*; and by the time the guard *x*, has reached its original position, the barrels will be in close contact with the plugs *v*, *v*, and the cartridges rammed home.

The patentee claims, First, the improvements in that part of a fire-arm, commonly called the lock, hereinbefore described, by which a succession of priming, in a tube or case, is presented to the touch-hole, and as much as is necessary for each discharge is cut off, or otherwise separated from the rest, and exploded, in order to discharge the gun, upon an anvil or shelf, contrived for the purpose, without igniting any portion of it.

Secondly,—The new arrangements of those parts of a musket, fowling-piece, or other like fire-arms, called the break-off, hut, plug, breech, and barrel, whereby the person who fires the gun is enabled to advance the barrel from the plug, tilt it up from the stock, load at the breech, bring the barrel down upon the stock again, and ram the cartridge, by bringing the barrel back to the plug, with the aid only of a single lever, which may be the trigger-guard itself, if required.—[*Inrolled in the Inrolment Office, November, 1834.*]

To LUKE SMITH, of Manchester, in the county of Lancaster, cotton manufacturer, and JOHN SMITH, of Heywood, in the same county, machine-maker, for certain improvements in weaving machinery.—[Sealed 24th May, 1834.]

THE first part of these improvements relates to the mode by which the picking-sticks are made to operate. Instead of operating on the picking-sticks, by the mechanism heretofore employed, the patentees fix on the peripheries of the two fly-wheels, which are placed one at each side of the loom, under the picking-sticks, certain inclined curvilinear projections, which they call inclined planes, and each inclined plane is made to operate upon its respective picking-stick, at every second revolution of the crank-shaft, on which the fly-wheels are fixed; one picking-stick being operated on at one revolution, whilst the other is at rest, and the latter put in motion at the succeeding revolution, when the former is at rest. This state of rest is obtained by moving the picking-stick by any suitable mechanism, alternately out of the line of action of the inclined planes.

In Plate XII., fig. 1, is a side view, and fig. 2, a plan of one of the fly-wheels, and one of the picking-sticks, with its appendages. *a*, is the fly-wheel; *b*, an inclined plane, fixed on it, which, by the revolution of the wheel, comes in

contact with an anti-friction roller *c*, mounted on a stud, fixed to the socket of the picking-stick *d*, and moves that end of the picking-stick outwards, causing the other end, which communicates motion to the picker, to move inwards, in the direction of the arrow, fig. 2. The stud is adjusted by moving it in the slot *e*, and fixed at any desired point, by a nut above. *f, f*, is the top rail, to which is secured a centre pin *g*, by means of the nut *h*; and from this pin is suspended the picking-stick *d*, through a collar *i*, in which the pin passes, and becomes its centre of motion. *j*, is a bell-crank, suspended from the top rail upon a swivel-joint, which crank operates upon the picking-stick, and removes it out of the range of the inclined planes, by the action of the mechanism before alluded to.

To guard against an accident occurring, by a revolution of the fly-wheel in the contrary direction, a piece *k*, is attached to the inclined plane *b*, at an opposite angle to that plane, which piece receives and throws off the roller *c*, without producing any injury to the loom.

The second part of the invention has for its object the production of a substitute for the back roller of the loom. It consists of a cast-iron rail *l*, bolted to the frame of the loom, having a longitudinal cavity or groove in its upper side, extending to within two or three inches of each end of it;—in this groove a loose cast-iron rail *m*, is placed, of the sectional form represented in the drawing, being smoothed over at the top, and over it the warp is stretched.

The patentees claim the mode described of giving motion to the picking-sticks, by means of inclined planes, fixed on the fly-wheels; and also the substitute for the back roller described and delineated in fig. 3.—[*Inrolled in the Inrolment Office, November, 1834.*]

To WILLIAM CROFTS, of New Radford, in the county of Nottingham, machine-maker, for certain improvements in certain machinery for making lace, commonly called bobbin net lace.—[Sealed 27th May, 1834.]

THE first part of these improvements consists in applying to circular bolt double-tier machinery an additional row of circular combs of a single tier gauge. The additional row is applied between the two rows of warp threads of a double

tier gauge, such as are usually employed in double-tier machines, but which rows of warp threads are separated so far apart from each other, that one row of the bobbin carriages will have passed quite through one row of separated warp threads, before the same bobbin carriages begin to make their entrance between the other row of warp threads. The additional row of combs being of a single-tier gauge, as before-mentioned, will contain a sufficient number of geats to receive all the bobbin carriages, when both rows are collected into one straight row within them, and the bobbin carriages are made of a single-tier gauge, to admit of collecting them all into one row in the additional combs, in which case they will be wholly included within the interval left between the two rows of separated warp threads, leaving those threads quite detached, and at liberty to be racked after all the bobbin carriages have been so collected into one row in the middle row of combs.

Another part of the improvements consists in certain means of communicating to the two rows of bobbin carriages, their requisite vibrating or backwards and forwards motions, in their three rows of cells, in order to pass and repass them between the two rows of guide threads, by simultaneous action. For this purpose, two rows of hooked pushers are employed, one row being applied to the front row of circular bolts, and the other row to the back row of bolts; they act in suitable notches, which are formed in those parts of the bobbin carriages that project through the geats of the circular bolts, or combs, so as to extend beyond the convex curvature of the bolts.

The hooked pushers are disposed side by side in their respective rows, at suitable distances apart, to make them correspond with the guide threads, and also with the geats in the two rows of circular bolts; and in order that the hooked pushers, when reaching through the warp threads to communicate the necessary motions to the bobbin carriages, may not prevent the racking of those threads, the pushers are racked coincidently with the warp threads to which they respectively belong, so that the pushers will never touch or bend aside the warp threads between which they are inserted.

When making narrow breadths of bobbin net-lace, besides the parts before-mentioned, an addition is made of two rows of "pickers," which are placed above the middle row of combs, and correspond in number with the hooked

pushers. The office of the pickers is to actuate the carriages, when they are collected into one row in the middle row of combs, and to pick out the carriages therefrom, and move them far enough out between the warp threads, and into the circular bolts, to put them within reach of the hooked pushers, without requiring these pushers to reach through between the warp threads, as before-mentioned, in order to take the carriages out of the middle row of combs.

Moreover, as the machinery for making narrow breadths of bobbin net-lace, must be adapted to introduce lacing, or whipping threads, for uniting the several breadths together while they are being made, and which can be withdrawn when the net is finished, such lacing threads may be introduced into the machinery, constructed according to these improvements, from a suitable small roller, or beam, distinct from the warp roller, by means of extra guides, affixed to an extra guide-bar. This guide-bar may be applied and worked in the machinery, in a similar manner to other bobbin-net machinery, wherein the lacing threads are supplied from a roller, and guided through extra guides.

Another improvement consists in applying in each of the rows of hooked pushers, certain individual hooked pushers, as part of these rows, and disposed therein, at all those places where turn-again evolutions may be required to be made by the bobbin carriages, in any use which can be made of the machinery constructed according to these improvements, whether for making the selvages of breadths of bobbin net-lace, or for making bobbin net-lace with ornamental work of the kind called fancy bullet-holing. Each of the said individual, or independent hooked pushers, is formed at one extremity of a lever, which is mounted upon a centre of motion of its own, all the centres being sustained by the pusher-bars, whereby the remainder of the rows of pushers are sustained, and actuated, and the independent pushers may act along with the other pushers in the same row, as part of the row, when no turn-again action is required to be made.

To the other extremity of each lever a small notched wheel, similar to a racking-wheel, is applied, all the several notched wheels being mounted side by side, upon one long horizontal axis, or spindle, which is sustained in suitable bearings affixed to the pusher-bar. The notched wheels being turned round, will actuate the levers by notches, or

suitable elevations and depressions in their circumferences, so as to allow the independent hooked pusher at the other extremity of each lever, to be removed by the action of a spring, so far out of its place in the row of hooked pushers, that it will not operate upon the carriage to which it belongs, but will miss that carriage, and leave it motionless in the outer row of circular bolts, whilst the other hooked pushers are driving all the other carriages of the same row out of the outer row of circular bolts into the middle row: the carriages so left, will then perform their own turn-again evolutions. But after the carriages have performed that turn-again, the notched wheel may, if required, be made to actuate the lever, which has the independent hooked pusher at the end of it, so as to restore that pusher to its proper place in the row of pushers, and then it will operate as one of them in the way before-mentioned.

Instead of affixing a row of distinct notched wheels, side by side, upon a long horizontal axis, or spindle, the same effect may be attained by using a long cylindrical barrel, with pins projecting out from its cylindrical surface, in the manner of an organ barrel, those pins being adapted to actuate the several levers of the independent pushers, in the same manner as the pins in an organ barrel act upon the keys, or levers, by which the organ pipes are made to sound when required.

The drawing, in Plate XII., represents the transverse vertical section of a machine, constructed according to these improvements, for making a wide piece of bobbin net-lace, the machinery being placed in an inverted position to that which is most common in circular bolt or circular comb machines. *a, b*, are the two outside rows of circular bolts, or combs, the leads of which contain ten points per inch for what is called a ten-point guage, and are affixed by screws in straight rows along the comb bars, *c, d*.

These bars are placed horizontally in the machine, nearly in the usual manner of circular bolt machines, except that the position of the combs is inverted, and they are much shorter than usual, because they are only intended to receive one row of carriages instead of two. *e*, is the middle row of combs, the leads of which contain twenty combs an inch, and are affixed by screws in a straight row along the middle comb bar *f*, which is applied horizontally in the centre of the machine, so that

the row of middle combs *e*, will stand between the two rows of guides *g*, *h*, which are disposed at a sufficient distance asunder, to admit of all the carriages that are worked at once in the machinery being included between the two rows of warp threads, without interfering therewith, whenever both rows of bobbin carriages, *i*, *j*, are collected into one row in the middle combs.

k, is the front row of hooked pushers, and *l*, the back row, the leads of which contain ten pushers per inch, and are affixed by screws in straight rows along the edges of two thin broad rulers or flat bars *m*, which project out from the two pusher-bars *n*, *o*, being firmly fixed thereto, in the manner of blades. The two pusher-bars *n*, *o*, are suspended and applied in the usual manner of applying those bars in pusher machinery, so that the extreme ends of the hooked pushers *k*, *l*, will move in "arches of circles," concentric with the circular curvature of the combs *a*, *b*, and *e*.

The pusher-bars always continue horizontal and parallel to each other; and as all the motions which can be given to them, will be equal and simultaneous, but in contrary directions, it will be evident, that when the hooked ends of the front pushers *k*, ascend the circular curvature of the combs *a*, *e*, towards the summit of the arch, the back pushers *l*, will do the same, and *vice versa*, both returning to their former positions at the same time. Therefore, when the hooked extremities of the pushers are inserted in the notches of the bobbin carriages, and are moved with their peculiar motions, respectively, they will move the two rows of carriages in the combs in contrary directions, making them mutually approach to or recede from each other, with equal and simultaneous motions.

The guides *g*, *h*, and the guide-bars on which they are fixed, are the same as in other bobbin-net machinery, being mounted in suitable bearings at each end of the frame, so as to admit of giving suitable racking motions to them. The warp-roller may be the same as usual in other bobbin-net machines, or two warp-rollers *p*, *p*, may be used,—one to supply the front row of warp-threads, and the other the back row. The lace-roller *q*, is likewise the same as in other bobbin-net machinery. The points *r*, *s*, are ten per inch, and then bars are applied and actuated, in the usual manner of applying and actuating such bars in bobbin-net machines, which are worked in an inverted position.

t, u, are the independent hooked pushers before mentioned. Each independent pusher is a small thin lever, and two such levers are mounted, side by side, in a sort of frame, composed of three guide-plates *v*, united together by leads, at each end; which leads are fastened by screws to the upright faces of the two pusher-bars *n, o*, and to the upper surfaces of the leads of the pushers *k, l*. When the guide-plates are so fixed, two of the levers *t*, or *u*, which form the independent hooked pushers, are inserted, side by side, into the two spaces between the guide-plates *v*, and mounted therein on a centre-pin, which passes through the three guide-plates, as well as through the two levers. The hooked ends of those levers may then be made to range amongst the other hooked pushers *k, l*, like two of them; or one or other of the levers may be lifted up, so as to take up their hooked ends out of that row, and leave a vacancy therein.

w, w, are the notched wheels, by which the tail ends of the levers *t, u*, are lifted up, and consequently the hooked end is kept down in its proper place, so as to range amongst the other hooked pushers in the same row, like one of them; but when a notch in the wheel presents itself to the tail end of the lever, the same will, by a spring *x*, be put into a suitable position for raising its hooked end out of its proper place in the row of pushers, so as to leave a vacancy therein. The wheels *w, w*, are fixed, side by side, on horizontal axes *y, y*, which are mounted in suitable bearings, affixed to the two pusher-bars *n, o*, so as in all cases to move therewith; and each axis is turned round, when requisite, by means of a ratchet-wheel *z*, driven by a long driver *z**.

The patentee claims the application to machines for making bobbin net-lace, of a middle row of combs, or cells, for the reception of all the bobbin carriages in one row, which row can be wholly contained between the two rows of warp threads, whilst the same are being racked; likewise, the mode hereinbefore described, of moving the bobbin carriages, with their requisite evolutions, into and out of such row of middle combs, by means of the parts described as hooked pushers and pickers; and also, the mode hereinbefore described, of applying a row of notched wheels, mounted on an axis, (or else an organ barrel), to actuate independent hooked pushers in such a manner as to make fancy bullet-holes, at any part of the width of the

wide piece of bobbin-net, (or of breadths of the same,) according to any pattern which the said notched wheels, or organ barrel, may have been previously constructed to produce.—[*Inrolled at the Rolls Chapel Office, November, 1834.*]

To WILLIAM HENRY HORNBY, of Blackburn, in the county of Lancaster, cotton spinner and merchant, and WILLIAM KENWORTHY, of Blackburn, aforesaid, engineer, for certain improvements in power looms, to be used in the weaving of cotton, linen, silk, woollen, and other cloths.—[Sealed 27th May, 1834.]

THE first improvement consists in a mode, by which the momentum, acquired by the fly-wheel during the working of the loom, is prevented from causing any injury to the various parts of the machinery, when that momentum is suddenly checked by the stopping of the loom.

The fly-wheel is fixed on the loose pulley, which is made one-half broader than usual, whilst the fast pulley is only half the usual breadth; and in order that the momentum of the fly-wheel may be made available in the working of the loom, the driving strap, when in operation, is thrown partly on the fast and partly on the loose pulley; by which means, (the driving-strap being a little wider than usual,) the advantages of the fly-wheel are preserved, and sufficient power for driving the loom is derived.

When the loom is suddenly stopped, owing to the shuttle making a false pick or otherwise, the momentum which the fly-wheel attains, while the loom is working, will not occasion any injury or derangement to its parts, but will cause the loose pulley to slip under the tension and pressure of the driving-strap.

The second improvement consists in varying the rate or ratio of speed at which the cloth is taken up,—the apparatus is shewn in Plate XII. *a*, is a friction-pulley, faced with leather on its periphery, which is capable of sliding along the tappet-shaft *b*, being secured thereon, at any desired place, by the set-screw *c*; this pulley, by friction or pressure, communicates motion to the face-plate *d*, fixed on the shaft *e*, and thereby causes that shaft to revolve. The shaft *e*, is carried by the bearings *f*, and *g*,—the latter containing a spiral spring, which presses against the end

of the shaft *e*; the pressure of this spring, and consequently the pressure of the face-plate against the friction-pulley, being regulated by the screw *h*. Upon the shaft *e*, is a small pinion *i*, taking into the wheel *j*, on the short shaft *k*, and by means of the worm *l*, on that shaft, the worm-wheel fixed on the end of the roller *m*, is driven. This roller is placed above, and in contact with, the cloth-beam *n*; the end pivots of which are carried by two arms or levers, secured to an axis at the front of the loom. The other ends of the levers are fastened to a chain, which passes over a roller, and has a weight suspended from it; by means of this weight, a pressure is produced between the roller *m*, and the cloth-beam, sufficient for taking up the cloth which passes over the roller *m*, on its way to the cloth-beam; and as the speed of the cloth-beam will decrease, when its diameter increases by the accumulation of cloth upon it, the requisite differential motion in taking up the cloth is obtained.

In order to throw the pinion *i*, out of gear with the wheel *j*, for the purpose of stopping the taking-up, (when the loom stops,) the pinion is slidden along its shaft by an elbow lever, which has always a tendency to throw the pinion out of gear, but is prevented from doing so by its outer end being held by the spring-handle that shifts the driving-strap of the loom; but when that handle acts to throw the loom out of gear, it releases the end of the elbow lever, which then slides the pinion *i*, along the shaft *e*, and stops the taking-up.

The third improvement consists in a mode of stopping the loom when the weft breaks. *o*, is the reed of the loom, the top edge of which is slipped into the reed-back *p*, while its bottom edge rests on a slipper or angle-plate, fixed at each end to the upper end of a steel spring *q*, the lower end of which is fastened to an arm, projecting from the sword of the lay. The bottom edge of the reed and the slipper are placed in a long groove, formed in the body of the lay, being capable of moving, in a slight degree, transversely in the groove, every time the reed meets the verge of the cloth in the laying of a shoot; but when there is no opposition presented to the reed, owing to the absence of the weft, the springs *q*, and the slipper, keep the reed close up against the side *r*, of the groove, a due degree of pressure being given to the reed, by the action of the set-screw *s*, on the spring *q*.

To that end of the slipper which is next the driving end of the loom, a catch *t*, is attached by a pin; which catch proceeds through a hole in the lay, and protrudes, to a certain extent, in front of it, the upper part of the catch being gently pressed on by a small spring *u*, fixed to the front of the lay. Opposite the catch *t*, and fixed on a short shaft *v*, is a short vertical lever *w*, and on the opposite end of the shaft is fixed another lever, the top end of which, when the driving-strap is on the fast pulley, acts as a stop to the spring-handle that shifts the driving-strap, in order to keep the same from acting on the strap.

This apparatus is so adjusted, that every time the reed lays the weft, it is made to fly back from the side *r*, of the groove, and at the same time the catch *t*, is brought within a small distance of catching the end of the lever *w*. If the weft breaks, and the loom continues working, (the progress of taking-up still going on,) the opposition to the reed gradually ceases, and after a few picks of the loom, the catch *t*, drops on the end of the lever *w*, and at the returning stroke of the lay, the catch pulls the lever forward, in the direction of its motion, until it slips off the end of it. The stop-lever is, by this means, caused to liberate the spring-handle, and the loom is stopped.

When the weft is pieced, and before the loom is set to work again, the weaver, by means of the wheel-handle *x*, on the end of the shaft *k*, lets back the cloth to the place it was at when the weft broke.

The patentees claim, first, the arrangement by which the momentum of the fly-wheel is taken off the fast, and placed on the loose, driving-pulley; from whence, being brought to act on the driving-strap, its force is made available in driving the loom, when the said strap is working on the fast pulley thereof, and is prevented from causing injury or derangement to any of the parts belonging to the loom, when the momentum is suddenly checked, by the shuttle making a false pick, or otherwise.

Secondly,—The application of the machinery or apparatus by which the rate or ratio of speed, in the taking-up of the cloth, is obtained, without the use of change-pinions, and principally by the application and use of the friction-pulley and face-plate, which rate or ratio of speed, in the taking-up, is unintermitting and uniform.

Thirdly,—The arrangement by which the combined effect of the vibrating or fly-reed, together with a system of levers

or other machinery, connected with, or acting on, the throwing-out-of-gear apparatus of the loom, is made to stop the loom when the weft breaks.—[*Inrolled in the Inrolment Office, November, 1834.*]

Original Papers.

REPORT ON THE BUDE LIGHT.

BY ANDREW URE, M.D., F.R.S.,

Professor of Chemistry, Consulting and Analytical Chemist, &c.

From the Report of a Committee of the House of Commons, it appears that this light is so called from *Bude*, in *Cornwall*, the residence of its inventor, Mr. GURNEY—a name bestowed upon it at the Trinity House, to distinguish it from the ignited Lime light, which he first described in his Work on Chemistry, in the year 1823.

The Bude light originally consisted of an oil Argand flame, having a stream of oxygen thrown up over its internal surface, which produced a very vivid illumination. It was found, however, after having been used for some time in lighting the House of Commons, that oil lamps thus fed with vital air were expensive and difficult to regulate.

Mr. GURNEY then tried to illuminate the House with naphthalized coal gas, in Argand burners, similarly supplied with oxygen; and though this produced a light of sufficient intensity, he encountered a formidable obstacle to its continuance from the deposition of liquid naphtha in the tubes of distribution. He next happily devised a method of obtaining from ordinary coal gas, purified in a simple apparatus of his own, and burned with oxygen derived from the atmosphere, an effulgence adequate to every purpose of internal and external illumination, which is now used in the House of Commons with perfect success, and at a cost of only twelve shillings per night, whereas that of the candles,

previously used there, amounted to six pounds, eleven shillings, per night.

This new Bude light possesses the following advantages over all other kinds of artificial illumination hitherto displayed:—

First.—It gives as much light as the best Argand gas flames, with only one half the expenditure of gas. This very remarkable fact was established by experiments carefully conducted with the same standard wax candles which I employed for comparison prior to my examination before the late committee appointed to ascertain the best mode of lighting the House of Commons. A common Argand gas flame was found to emit a light equal to ten such candles (three to the pound,) and a Bude burner, called No. 10, gave a light equal to 94.7 of the candles. Thus the Bude flame had nearly ten times the illuminating power of the gas Argand flame, while, by means of an accurate gas metre, the former was ascertained to consume only 4.4 times the quantity of gas consumed by the latter, demonstrating the economy of the Bude light over common gas to be greater than two to one; and this economy increases in proportion to the magnitude of the light.

The source of this surprising superiority may be observed by comparing the two flames:—the base of the Argand gas flame is of a blue tint for fourteen-sixteenths of an inch, a space in which the gas burns with intense heat, but little or no light; whereas the base of the Bude flame acquires a dazzling whiteness at three-sixteenths of an inch from the metal; thus we see that through a range of eleven-sixteenths of an inch, the common gas Argand flame is wasted in producing the nuisance of heat without light.

Secondly.—From the phenomena just noticed, as also from the circumstance of the Bude flame emitting a double light with a single volume of gas, when compared with the gas Argand, it is manifest that the former, in equal degree, can disengage, at the utmost, only half the heat that the latter does.

Thirdly.—The Bude light simplifies greatly the means of artificial illumination, since it concentrates in one flame as much

light as will diffuse, throughout a large apartment, a mid-day lustre, which may be softened by shades of every hue, and reflected by mirrors in every direction.

Fourthly.—From this property proceeds its value as a ventilator, since the single tube which carries off the burned gases, serves to draw out also the effluvia from a crowded chamber.

From all these facts, I am of opinion that Mr. GURNEY's new Bude light is a most meritorious invention in reference to both public and private buildings, as it removes altogether the objections hitherto justly urged against the use of the highly hydrogeous gas of the London Companies in dwelling houses,—namely, that its heat is great in proportion to its light, when compared with the more highly carburetted gases of Edinburgh and Glasgow.

The time must therefore be now at hand when the great economy and convenience of lighting private houses with gas will be experienced by the inhabitants of the metropolis, as they have been for such a considerable time by those of every town of importance in Scotland.

That the same quantity of coal gas may be made to produce a double amount of illumination in Mr. Gurney's patent burner, to that obtained from it in an ordinary Argand, will appear to many a paradoxical, if not a doubtful, proposition. Of its reality, however, I am fully convinced, and I think the fact may be accounted for in the following way:—

Light, in general, is proportional to the intensity of ignition, a truth well exemplified in the effect of the oxy-hydrogen flame upon a bit of lime or clay. On the same principle, when the flames of two candles are brought into close contact, they afford a compound light, considerably greater than the sum of their separate lights. Now Mr. Gurney's burner gives such a compound flame. It consists of two or more concentric circles of holes, and consequently of two or more concentric cylinders of flame, mutually enhancing each others temperature, just as in Fresnel's polycycle oil Argand lamps, used in the French light-houses.

In addition to the augmented intensity of ignition, we must also take into account the peculiar nature of the combustion of carburetted hydrogen gas, whether as generated from coal in a retort or from oil in a lamp. The vivid whiteness of its flame is due to the separation in solid particles, and subsequent ignition of its carbon. Pure hydrogen, when burned, affords a very feeble light; and whenever so much air is mixed with coal gas as is sufficient to consume all its carbon simultaneously with its hydrogen, it burns with a dim blue flame. Now, in the base of a common Argand flame, an excess of cold atmospheric oxygen is allowed to act upon the coal gas in the vacant spaces between the pin-holes, whereby the temperature being greatly lowered, while the carbon is consumed in the gaseous state, the light from these two causes is nearly null. It is not till the gaseous mixture rises and forms a continuous hot cylinder, without interstitial streams of air, that it emits a white light from the ignited particles of the carbon precipitated in the interior of the flame. In Mr. Gurney's concentric series, the prejudicial excess of atmospheric air is prevented, and only so much permitted to come into contact with the gas, as will effect the due separation and ignition of its carbon, even at the origin of the flame.

To these two causes conjoined, viz., the increased intensity of ignition, and the limited supply of oxygen, it is that the new Bude flame owes its economy of illumination. The effect of oxygen in excess, is elegantly demonstrated by throwing up a stream of it within a gas Argand flame, for the light is thus nearly annihilated, while the heat is prodigiously augmented.

As regards the specification of the Patent for this improved mode of lighting, which I have carefully examined, I have no hesitation in declaring it, in my opinion, to be valid and unpeachable.

ON THE ENGINEERING OF THE ANCIENT EGYPTIANS.

BY J. S. PERRING, ESQ.

MANY YEARS A RESIDENT IN EGYPT.

No. VI.

The sharpness, depth, and delicacy of their sculptures, particularly on their granite obelisks, may excite our surprise, for it seems quite certain, that the use of iron tools was unknown to them. The best specimen existing is on the obelisk of Luxor, where the figures are sunk in to the depth of two inches, squarely and truly cut, and then polished; and from the minuteness of certain parts, the tools employed must have been very small and delicate, yet of the most perfect temper;—so extremely difficult has appeared the execution of these, that many have come to the conclusion that these sculptures were not cut, but engraved with a drill, and have argued, that a copper tool, being soft, would, by retaining the emery powder used, facilitate the operation. In this conclusion we cannot however agree;—a careful examination of many obelisks, and other specimens of sculptured granite, having shewn us that they were executed with a chisel; some of their designs also exhibit workmen cutting out the inscriptions on granite statues, with a chisel and mallet.

We must therefore allow, that the Egyptians possessed an art that is now unknown, and were able to harden and temper bronze, so as to cut the hardest stone, and to execute work with bronze tools, which even our best instruments cannot accomplish.

The present limited use of granite arises entirely from the expense of working it; and we may be allowed to hope, that practical men will turn their attention to improvement in the manufacture of bronze,—a metal which, for the above purpose, has been shewn superior to steel.

Egyptian bronze consisted of copper and tin, and occasionally

a small proportion of silver was added. For large tools, it was probably a mixture of the two former metals only. This alloy, when first cast, would be extremely brittle and hard, but may have been tempered as the Chinese now temper their bronze articles,—viz., by plunging them repeatedly into cold water whilst at a red heat. To this operation perhaps Homer alludes in his simile of an armourer's forge, though it has been adduced to prove the use of iron; but that metal does not, at the later period of the Trojan war, seem to have been in general use. It even then seems to have been viewed as one of the precious metals, as Achilles proposed a ball of iron as one of the prizes to be awarded to the victor of the games instituted in honor of Patroclus;—offerings of iron implements were also made to the gods.

With regard to the early use of bronze in preference to iron, we cannot forbear transcribing some remarks from Robertson's *History of North America*:—"Gold, silver, and copper, are found, in their perfect state, in the clefts of rocks, in the sides of mountains, or the channels of rivers. They were accordingly first known, and first applied to use. But iron, the most serviceable of all metals, and to which man is most indebted, is never discovered in its perfect form; its gross and stubborn ore must feel twice the force of fire, and go through two laborious processes before it becomes fit for use. Man was long acquainted with other metals before he acquired the art of fabricating iron."

Several small articles of iron have been found in Egyptian tombs; but though acquainted with it, they do not appear to have applied it to any practically useful purpose.

In the British Museum are several chisels, saws, and other tools of bronze; and the author has a fish-hook of the same material, found in a tomb, and also several pins of the latest modern improvement, namely, with solid heads. A small bronze knife, found at Thebes, was highly elastic, and the edge, after being buried at least 2000 years, so perfect, that it was used for a pen-knife for several months after its exhumation.

The Egyptians used emery or some similar substance in sawing

basalt and granite. The sarcophagi found in several of the pyramids, have evidently been sawn out, as the marks still remain ; and on the one belonging to the third pyramid of Gizeh, opened by Colonel Howard Vyse, a saw kerf at the bottom shewed that a copper saw had been used. For cutting softer stones, however, the Egyptians used a toothed saw ; and the author of these papers having observed this, followed their plan to a considerable extent, with much success. For wood-work, a hand-saw seems to have been much used, but we do not recollect seeing an instance of the use of a double-handed saw ; but the wood of Egypt was of small size, and therefore not requiring it. The invention of the saw was thought to be of such importance by the Greeks, that they deified the supposed inventor.

None of the paintings make us acquainted with the form of their lathe. We have often considered, that some invention, answering the purpose of a slide-rest, was known to the Egyptians. The lathe would first be applied, we may suppose, to turning articles of wood and ivory ; but, at a very early period, they seem to have applied it to stone ! for in the great pyramid of Sakkara were found many fragments of marble and alabaster vases and tazzas that had evidently been turned in a lathe. What excellent temper their tools must have possessed to have executed some of these delicate articles ! In some instances, their thickness scarcely exceeded the eighth of an inch, the object being to increase their beauty by making them semi-transparent.

The Egyptians were the manufacturers of every thing that was rare and beautiful for the whole world ; and to Egypt was brought the raw material from every part of the globe ; hence, what they did not in themselves possess, was obtained without difficulty. Though we cannot hope, in a series of short desultory papers, to investigate every subject, we may refer to a few striking points, illustrative of their extreme ability as metallurgists.

The union of pieces of metal, by soldering, was common ; and

care seems to have been taken to use a solder, nearly resembling, in colour, the article itself, so much so that several specimens we have met with appeared to be cast entire; and it was only the difficulty of moulding some, that induced a more particular examination of the article. Their bronze was brazed together, and the hard solder used seems to have been composed of copper, tin, and lead or silver; (perhaps both,) the latter articles gave the compound fusibility.

Their bronze statues, after casting, were trimmed up with much care; and, from a passage of Diodorus, we learn that their artists furnished images of the deities of that metal for the Greek temples.

The Egyptian mirrors were polished plates of bronze, brought to a splendid reflective surface. Bronze was their useful metal; of it was formed their warlike weapons, the hinges of their doors, and in their large buildings the cramps connecting the stones of the walls.

Silver and lead were rare, but gold extremely common, and used largely for ornamental purposes, the goldsmith of that period being fully equal in skill to his descendant in Europe of the present day.

Of the scale on which they conducted their mining operations, a curious and ample account is given by several ancient authors. "The kings of Egypt compelled those condemned for their crimes, together with their wives and children, and prisoners taken in war, to labour in the gold mines, wherein they underwent more suffering than can well be imagined. The hard rocks of the gold mountains being cleft by heating them with burning wood, the workmen then apply their metal instruments. The young and active, with metal hammers, break the rock in pieces, and form a number of narrow passages, not running in straight lines, but following the direction of the vein of gold, which is as irregular in its course as the roots of a tree. The workmen have lights, fastened on their forehead, by the aid of which they cut their way through the rock, always following the white veins of stone, (*i. e.* the quartz.)

The material that is loosened, is carried out of the galleries by boys, and received at the mouth of the mine by old men and the weaker labourers, who then carry it to the inspectors. There are young men, under thirty years of age, strong and vigorous, who pound the broken fragments in iron mortars, with a stone pestle, till there is no piece larger than a pea. It is then placed on grinding-stones, and women, three on each side, work at it until it is reduced to a fine powder. This powder is then passed on to a set of workmen, who place it on a finely-polished board, not laying in a flat position, but sloping a little. The workman, after pouring some water on the board, rubs it with his hand, at first gently, but afterwards more vigorously, by which process the lighter earthy particles slide off along the slope of the board, and the heavier parts are left behind. He then takes soft sponges, with which he presses on the board, rather gently, which causes the lighter particles to adhere to the sponge, while the heavy shining grains still keep their place on the board, owing to their weight. The gold particles are then transferred to the roasters, who measure and weigh all that they receive before putting it into an earthen jar. With the gold particles they mix lead, in a certain proportion, lumps of salt, a little tin, and barley bran, and putting a cover on the jar, that is luted tight, they burn it in a furnace for five days and nights without intermission. On the sixth day they cool the vessel and take out the pure refined gold. These mines were worked under the ancient kings of Egypt, but abandoned during the occupation of the country by the Ethiopians, and afterwards by the Medes and Persians. Even at the present day, (*i. e.* a short time previous to the Christian Era,) we may find copper chisels or implements in the galleries, (the use of iron not having been known at that time,) and innumerable skeletons of the wretched beings who lost their lives in the passages of the mines."

To the above clear account of Agarathicides, no addition is required, save that Mr. Bonomi, the well-known Egyptian traveller, describes the arrangement of the mines to be in perfect accordance with it.

The method, arrangement, and energy, shewn in the mining operations, is highly characteristic of the people, and their other public works were, no doubt, conducted with the same skill and enterprise.

Of their skill in weaving—of their thousand mechanical inventions, we might enlarge, though somewhat out of the proposed scope of these papers ; but enough, we trust, has been adduced to shew that Egypt was the fountain head of all our science, the inventress of all our arts, and, we add the self-gratulatory reflection, that “engineering is no new profession of to-day, but one which centuries ago, as now, was a powerful contributor to the progress of civilization, and the well-being of the human race.”

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 134, Vol. XX.)

SESSION 1842.—January 11.

The PRESIDENT in the Chair.

“Description of a portion of the Works of the Ulster Canal.”

By Thomas Casebourne, M. Inst. C. E.

The Ulster Canal, which is described in this communication, was designed for the purpose of facilitating the intercourse between the west and the north of Ireland. It commences at the southern extremity of Lough Erne, in the county of Fermanagh, whence it extends for a length of 46 miles, and enters the river Blackwater, near the village of Charlemont, in the county of Armagh, from which there is an outlet through Lough Neagh to the ports of Newry and Belfast. The total cost of this work will amount to about 210,000*l.*, or 4,565*l.* per mile.

Allusion is made to a proposed junction canal between the

rivers Boyle and Shannon, which may be considered as an extension of the Ulster Canal westward, effecting a junction between all the navigations of Ireland. By its means the produce of the town of Boyle, and the agricultural district around it, would be conveyed directly by steam to Belfast and Newry.

At the time of this communication, the Ulster Canal was rapidly advancing towards completion; it was navigable up to Clones, a distance of 40 miles from its commencement, and would be opened to Lough Erne during the summer of 1841.

A description is given of the most difficult and expensive portion of the canal, which is situated at about six miles along the line from Charlemont. The length of this part is about three-fourths of a mile, and it comprises seven locks. The expense of construction, exclusive of the value of land, was 17,053*l.* 4*s.* 9*d.*; in order to diminish the expense as much as possible, the canal was contracted in width in two points, where the local impediments were considerable. The transverse dimensions of the canal are, 19 feet 6 inches at the bottom, 36 feet at the surface of the water, and 42 feet at the top of the bank,—giving a slope of 3 to 2 at the sides of the channel. The depth of water is 5 feet 6 inches in all the reaches, except the summit level, which is capable of containing 7 feet of water. The course of this portion of the line lay along the bottom of a steep ravine in a limestone rock, parallel with the channel of a mill-race adjacent to the river Blackwater; the mill-race was, therefore, diverted into the river between the first and fifth locks of the canal. Between the third and fifth locks the bed of the canal was formed by benching in the rock on one side, and embanking on the other with the materials so obtained; beyond this it was cut for a distance of nearly 350 yards through the limestone; in one place to a depth of 41 feet. The sides and bed were there lined with puddle, and protected by a facing of rubble wall. Thence, to the seventh lock, the channel was again formed by benching and embanking through a clay soil, where much caution was necessarily exercised in preventing slips at the foot of the embankment, which was subject to inundations from the Blackwater.

The masonry was all constructed of limestone from an adjacent quarry.

Two Appendices are subjoined to this Paper. The first of these gives in detail the items of expenditure for the portion of the canal described; the second contains a particular description of the locks and lock-gates, the bridges, and the earth-work. The locks are 73 feet long, 12 feet wide, and vary in rise from 6 to 11 feet. They are all constructed in ashlar masonry.

The Paper is accompanied by three Drawings, descriptive of the general plan and the details of these works, which were originally designed by Mr. Telford, and are now under the direction of Mr. Cubitt. They have been executed almost entirely under the superintendence of the author.

“An account of the permanent way of the Birmingham and Gloucester Railway.”

By G. B. W. Jackson, Grad. Inst. C. E.

The object of this Railway is to afford a direct communication between the Western and the Midland Counties of England. The communication describes the course of the line until it reaches Cheltenham, where it joins that which was formerly called the Great Western and Cheltenham Railway, which terminates at Gloucester. Its length is 54 miles. The prevailing inclination is 1 in 300; but on the “Lickey” incline, near Bromsgrove, the rise is 1 in 37 for a distance of $2\frac{1}{2}$ miles, in ascending which the trains are worked by American locomotives, in addition to the usual train engines. The northern portion of the Railway appears to lie on the new red sandstone; then passes to the oolitic formation, on which it terminates. In the former, the principal cuttings are through marl, some of which is exceedingly indurated, and troublesome to work. The principal strata of the latter system are blue and yellow clays. Near Cheltenham, the shifting sand frequently rendered sheet-piling necessary in passing through it. The waters of Droitwich and Cheltenham were found to possess a saline quality, which rendered them unfit for the use

of the engines; that from the surface sand near Cheltenham, is, however, extremely good.

The building materials employed on this line were—the sandstones of the Lickey and Forest of Dean, the lias of Norton and Wadborough, and the oolites of Cheltenham and Bredon, together with brick, for which earth was readily procured throughout.

The cuttings and embankments, with the details of the permanent way, are severally described. The surface width is 30 feet. In the formation of embankments and cuttings, the usual methods appear to have been adopted. In the former, the slopes vary between 3 and $2\frac{1}{2}$ to 1; in the latter, between 2 and $1\frac{1}{2}$ to 1.

In cuttings, there is a system of drainage beneath the ballast, consisting of longitudinal drains on either side of the line, connected by cross spits, all of which are filled up with broken stones. The rails are supported by chairs and intermediate saddles, which rest on longitudinal balks; and these are bolted to transverse ties. On embankments, whose height exceeds five feet, the cross spits, longitudinal balks, and saddles, are all dispensed with.

The length of the bearings, the weight, dimensions, &c., of the iron and wood work, with the manner of putting them together, are then noticed.

The timber employed was, American pine and English beech, or larch. The various prices are enumerated of the materials and labour for the permanent way, of which the average cost per mile amounted to 5,436*l*. The present condition of the line is stated to be good, and its general working to have been perfectly satisfactory, since its opening in June, 1840.

Annexed is a description of an artificial ballast obtained by burning clay, which was employed where the country did not afford natural ballast. Its expense slightly exceeds that of the ordinary ballast; blue clay burnt in kilns was found to answer the purpose best, but it does not appear to form a successful substitute for gravel. The results of experiment show it to form a very imperfect drain. The author states that he has always

observed the quality of this ballast to suffer in proportion with the quantity of lime contained in its composition.

The paper is accompanied by four Drawings, illustrating the construction of the permanent way.

"Description of a Water-pressure Engine at Illsang, in Bavaria."

By William Lewis Baker, Grad. Inst. C. E.

The machine described in this Paper is the most perfect among nine engines constructed by M. de Reichenbach, for the salt-works at Illsang, in Bavaria. These important works are situated in the most southern part of the kingdom; they are supplied from a mine in the valley of Berghesgaden, and the salt-springs at Reichenhall. The salt was procured from the former in two states,—that of rock salt, which was extracted by blasting, and that of brine. The rock salt was conveyed to Reichenhall, and there underwent the purifying process. But both these methods were attended with disadvantages from the scarcity of fuel; the old method was therefore abolished, and a line of pipes of 7 inches diameter was substituted, which was laid between the two places, a distance of about 60 miles.

A series of water-pressure engines, each working a forcing pump, and being themselves worked by a head of water, were placed in convenient situations upon the line. The mine is now worked by forming cavities in the beds of salt, and filling them with water, which soon becomes strongly saturated brine; it is then pumped up, and forced through the pipes to Reichenhall, where a portion of it is retained, and the rest is sent on to Frauenstein, which is at the extremity of the line. At these places, the process of evaporation is carried on, and the salt is manufactured in the usual manner.

The Paper is illustrated by a Drawing of the Engine, showing the details of construction alluded to in the communication.

"Memoir of Captain Huddart."—By William Cotton, F.R.S., &c.

This Memoir is intended by the author chiefly to supply some additional facts which are omitted in the account which was published by his son soon after the decease of this distinguished man, whose "great powers of mind, indefatigable industry, and high principles, raised him to a most honourable position among men of science."

Joseph Huddart was born at Allonby, in Cumberland, the 11th January, 1740. His father was a shoemaker and farmer, and had also a small interest in a herring-fishery. Young Huddart was placed under the tuition of Mr. Wilson, the clergyman of the village, and from his son, who had been at Glasgow, he acquired some knowledge of mathematics and astronomy. He early displayed much ingenuity in the construction of models of vessels and of machinery; and while herding his father's cattle, he was occupied in mathematical reading, drawing, and calculations. His determination to adopt a seafaring life was opposed by his friends; and it was not until he was called upon to take his share of the duties on board the herring-fishing boats, that his father was reconciled to his becoming a sailor. At this period, during the hours of rest after his labours, he was engaged in making nautical observations, and laid the foundation for the chart of St. George's Channel, which was published by his friend, Mr. Laurie, from his survey, and is still the best chart of that locality.

On the death of his father, in 1762, he took the command of a sloop which was employed in carrying salt herrings to Ireland. He then constructed a brig according to a model of his own, every timber being moulded by his own hands. In this vessel he traded for some years to America; until, in 1771, he was induced by Sir Richard Hotham (who had discovered and appreciated his judgment and knowledge) to leave the brig and engage in the East India mercantile marine. In this extensive field of usefulness, Huddart evinced the superiority of his talents and his inflexible integrity; and his example as a commander was gene-

rally followed. While in the Indian service his attention was drawn to the defects in the usual manufacture of cordage, and led to the improvements which he afterwards so successfully accomplished.

He subsequently took a prominent part in the direction of affairs at the Trinity House, the Ramsgate Harbour Trust, and the London and East India Docks, where the valuable advice given by him was properly appreciated, as it was also by the civil engineers, with whom he was so frequently called upon to co-operate.

The Memoir then relates many interesting anecdotes of his private life, illustrative of his general scientific acquirements, and of his amiable disposition. It then details, at considerable length, his experiments for the determination of the lines for ships, which, consistent with stability, and what might be required for the stowage of cargo, would give the greatest velocity through the water.

The author enters fully into the account of Huddart's inventions and improvements in rope machinery, which he raised to such a pitch of perfection. This machinery, which is now transferred to the Royal Dock Yards, has already been before brought under the notice of the Institution by Mr. Cotton and by Messrs. Dempsey and Birch, in communications, for which prizes were awarded. The general introduction of chain cables rendered this machinery less useful, but could not take from its original merit; and, in its present position, it will long remain a monument of Captain Huddart's perseverance, mechanical skill, and scientific knowledge.

Sir James South thought that Captain Huddart's scientific attainments as an astronomer had not received their due meed of praise in the Memoir; but more especially, that the equatorial instrument, which he was now fortunate enough to have in his possession, should have been alluded to more particularly.

That instrument was constructed by Messrs. Luke Howard and Co., of Old-street, from the designs and under the daily superintendence of Huddart. The greatest part of the instrument was put together with his own hands, and the result of this combination of skill and attention was, that up to the present time, the instrument had been unequalled; in fact he must be permitted to say, that he considered it *perfect*. It had been used for all kinds of observations,—transit, declination, and equatorial; and, in all, with equal satisfaction to the astronomer. With it Mr. Herschel had made many of his observations, and always expressed himself in the highest terms of it. It had been examined by most of the eminent constructors of instruments, as well as many civil engineers, who all entertained the same opinion of its perfection: and, after a minute inspection, one constructor observed,—“Here is the best system of edge-bars and bracing I ever saw, and my opinion of the instrument is, that it is perfect in every part.”

Sir James then related several anecdotes of Huddart's habits of observation. On one occasion, being ordered to sail from Madras, at a certain time, he delayed his departure, because he observed a sudden fall of nearly three-quarters of an inch in the mercury of the barometer. The result of this disobedience of orders (for which he incurred momentary censure) was, that his vessel alone of all the convoy escaped destruction.

The President believed that Captain Huddart was the first to mark out the direct course to China, which is so generally followed at present. He was also the first observer who took a transit instrument out with him, to determine the rate of the chronometer. It was particularly worthy of notice, that the equatorial instrument and the rope machinery, both of which had been designed by and executed under the directions of a self-educated man, destitute of the means of acquiring instruction either in astronomy or mechanics, had been, up to the present time, unequalled either in conception or in the perfection of their execution. Huddart was the constant co-ad-

jutor of civil engineers : he assisted the late Mr. Rennie in many of his surveys of harbours, and on those occasions had always the command of the vessel, even if he did not participate in the actual operations of the survey. Whether Huddart was viewed as a sailor, boldly striking out for himself a new track to his destination ; as a ship-builder, constructing a vessel in order to avoid the defects which he observed in the ordinary class of ships ; as a hydrographer, displaying in his chart of the St. George's Channel those powers of observation and of reasoning which made him an astronomer ; as a constructor of the equatorial instrument, which had been so justly commended ; or as a mechanic, designing and constructing one of the most beautiful pieces of machinery on record,—he appeared equally great.

The Institution was much indebted to Mr. Cotton for this Memoir of Captain Huddart, whose name would be always venerated by every member of the profession of civil engineering.

Mr. Thornthwaite must in justice correct a misapprehension relative to the laying machine for cables ; the idea of that machine originated with the Reverend Edmund Cartwright, who had projected more improvements in cotton machinery than any person, except Arkwright. The machine was materially modified by Captain Huddart, and to him must be given all the credit for the perfection of its proportions, and its careful construction, which had enabled a machine weighing 20 tons, and revolving rapidly upon one vertical spindle, to work a number of years without costing 5*l.* for repairs. The register, which preceded the laying machine several years, was entirely Huddart's invention, and was the origin of his improvements in rope machinery.

February 8, 1842.

The PRESIDENT in the Chair.

“Description of the Port of London, and of the Works at the
London Docks.”

By Robert Richardson, Grad. Inst. C. E.

In this communication the author examines the state of the Port of London, when the accommodation for landing and bonding foreign produce was almost entirely limited to a single spot, called the “Legal Quay,” which was only about 1,400 feet in length, extending downwards from London Bridge, affording no greater facilities for commerce in the beginning of the nineteenth century than in the year 1660, when the quay was appointed. This state of things continued until the year 1773, when Mr. J. Sharp suggested the formation of floating docks. In the year 1800, the West India Docks were commenced; in the year following the London Docks were projected, and in the year 1805, the East India Docks were commenced. For all these undertakings, Mr. Ralph Walker was appointed engineer, having Mr. William Jessop associated with him for the West India Docks. The Paper enters fully into the bad state of the navigation of the river, owing to defective management and other causes; gives a table showing the progressive increase of tonnage and number of ships from the beginning to the close of the last century; mentions the various plans of Dodd, Spence, Reevely, and others, for diverting the channel of the river for the formation of more extensive docks, near the Isle of Dogs; and then proceeds to detail minutely the origin and progress of the London Docks, giving the dimensions and mode of construction of the principal works connecting the Eastern Docks with the Thames, which were constructed under the superintendence of Mr. H. R. Palmer, to whom the author has been indebted for much of the information contained in the Paper.

The communication is accompanied by fifteen drawings, showing the details of construction of the locks and gates, bridges, quays, embankments, &c.

"Description of the Ponte della Maddelena, over the River Serchio, near Lucca."

By Richard Townshend, Assoc. Inst. C. E.

The bridge described in this communication, is situated about half-way between the town and the baths of Lucca, in the Grand Duchy of Tuscany; it was built by Castracani, in the year 1317, on the site of one which had been constructed by order of the Countess Matilda, early in the twelfth century, and subsequently destroyed; it is believed that a Roman bridge formerly existed on the same spot.

The present bridge is of grey limestone of the country. The large arch of 126 feet 6 inches span, is of a semicircular form, and springs directly from the rocky bed of the river, without any prepared foundation. The smaller arches are of various spans, 46 feet 10 inches, 33 feet, 28 feet, and 7 feet 6 inches. The style of construction is somewhat similar to that of the Pont-y-prydd, over the Taff, in South Wales.

An engraving of the bridge accompanied the Paper.

"Description of the Mill, Forge, and Furnaces, of a Welsh Iron Work."—

By Thomas Girdwood Hardie, Assoc. Inst. C. E.

The Author commences by describing the general plan of an iron work, consisting of six blast furnaces, four double-fire refineries, and a forge and mill, capable of converting into bar-iron the produce of the six blast furnaces.

He then enters very fully into certain alterations of the interior shape of the blast furnaces introduced by him at the Blaenavon works, from which have resulted an economy of fuel, regularity of work, and an improved quality of iron. The principal alterations appear to be, making the interior diameter greater above that at the boshes, and establishing a proper ratio between the diameter of the boshes and that of the charging place, and proportioning both to the height of the furnace. The opinions are

supported by calculations of the quantity of blast used in smelting given quantities of ore, and the effect which the form of the furnaces must have in directing the current of the blast through the materials, by which also the point of fusion would be necessarily affected, and the chemical combinations varied. The particulars are then given of the constructions of the furnaces at Blaenavon, and the details of the blowing engines, blast mains, regulators, valves, &c., with calculations of the quantity of blast used in the various processes of the manufacture. The construction of the casting-houses, with the mode of ventilating by the iron roof, is detailed. The general arrangements of the balance pits, coke yards, mine kilns, and bridge houses, are shown, and the author proceeds to describe the forge and mill, which have 35 puddling furnaces, with hammers, shears, rolls, and heating furnaces in proportion. He then condemns the usual practice of leaving the coupling boxes loose upon the spindles, as liable to break the rolls, shafts, or machinery, and gives the theoretical and practical reasonings for preferring fixed couplings.

The communication is illustrated by three drawings, showing the general distribution and the details of an iron work.

[*To be continued.*]

List of Patents

That have passed the Great Seal of IRELAND, from the 17th February to the 18th of April 1842, inclusive.

James Colley March, of Barnstable, in the county of Devon, surgeon, for certain improvements in producing heat from combustion of certain kinds of fuel.—Sealed 18th February.

James Colman, of Stoke Holycross, in the county of Norfolk, starch manufacturer, for improvements in the manufacture of starch.—Sealed 19th February.

Montagu Macdonough, of St. Alban's-place, Middlesex, Gent., for improvements in spindles, flyers, and bobbins, for spinning, roving, twisting, and reeling of all sorts of fibrous and textile

substances, and in the application or adoption of either, or all of them, to machinery for the same purpose.—Sealed 21st February.

Henry Hough Watson, of Bolton-le-Moors, in the county of Lancaster, consulting chemist, for certain improvements in dressing, stiffening, and finishing cotton and other fibrous substances, and textile and other fabrics, part or parts of which improvements are applicable to the manufacture of paper ; and also to some of the processes or operations connected with printing calicoes and other goods.—Sealed 23rd February.

William Palmer, of Sutton-street, Clerkenwell, in the county of Middlesex, manufacturer, for improvements in the manufacture of candles,—being partly a communication from abroad, and partly an invention of his own.—Sealed 26th February.

Francis Roubiliac Conder, of Highgate, in the county of Middlesex, civil engineer, for improvements in the cutting and shaping of wood, and in the machinery used for that purpose.—Sealed 26th February.

Charles Wye Williams, of Liverpool, in the county of Lancaster, Gent., for certain improvements in the making and moulding of bricks, artificial fuel, and other substances.—Sealed 5th March.

Thomas Stopford Jones, of Stafford-place, Pimlico, for certain improvements in machinery for propelling vessels by steam or other power.—Sealed 11th March.

George Jarman, of Leeds, in the county of York, flax and cotton spinner ; Robert Cook, of Hathersage, in the county of Derby, heckle and needle manufacturer ; and Joshua Wordsworth, of Leeds, aforesaid, machine-maker,—for certain improvements in machinery for spinning flax, hemp, and tow.—Sealed 11th March.

James Thorburn, of Manchester, in the county of Lancaster, machinist, for certain improvements in machinery for producing knitted fabrics.—Sealed 12th April.

John Hall, of Breezes Hill, Ratcliff Highway, in the county of Middlesex, sugar-refiner, for improvements in the construction of boilers for generating steam, and in the application of steam to mechanical powers.—Sealed 14th April.

Richard Hodgson, of Salisbury-street, Strand, in the county of Middlesex, Gent., for an invention of improvements in the forms or shapes of materials and substances used in building and paving, and in their combination for such purposes,—being a communication from a foreigner residing abroad.—Sealed 16th April.

Theophile Anton Wilhelm Count de Hompesch, of Burich Castle, near Aix la Chapelle, in the Kingdom of Prussia, for improvements in obtaining oils and other products from bituminous matters, and in purifying or rectifying oils obtained from such matters.—Sealed 18th April.

List of Patents

Granted for SCOTLAND, subsequent to March 22nd, 1842.

To Moses Poole, of Lincoln's Inn, in the county of Middlesex, Gent., for improvements in the manufacture of plaited fabrics,—being a communication from abroad.—Sealed 29th March.

James Hunt, of Whitehall, in the county of Middlesex, Gent., for improvements in the manufacture of bricks.—Sealed 29th March.

James Hall, of Glasgow, upholsterer, for improvements in beds, mattresses, and apparatus applicable to bedsteads, couches, and chairs.—Sealed 30th March.

John Harwood, of Great Portland-street, in the county of Middlesex, Gent., for an improved means of giving expansion to the chest.—Sealed 6th April.

James Andrew, of Manchester, in the county of Lancaster, manufacturer, for certain improvements in the method or

process of preparing or dressing yarns or warps for weaving.
—Sealed 6th April.

Edmund Morewood, of Winchester-buildings, Great Winchester-street, in the city of London, Esq., for an improved mode of preserving iron and other metals from oxydation or rust,—being a communication from abroad.—Sealed 7th April.

Henry Booth, of Liverpool, Esq., for improvements in the method of propelling vessels through water.—Sealed 13th April.

William Brockedon, of Queen-square, in the county of Middlesex, Gent., for improvements in the manufacturing of fibrous materials for the cores of stoppers, to be coated with India-rubber, and used for stopping bottles and other vessels.—Sealed 13th April.

Christopher Nickels, of York-road, Lambeth, in the county of Surrey, Gent., for improvements in the manufacture of plaited fabrics.—Sealed 13th April.

James Smith, of Deanston Works, in the parish of Kilmadock, and county of Perth, cotton spinner, and James Buchanan, of the city of Glasgow, merchant, for certain improvements applicable to the preparing and spinning of cotton, wool, flax, hemp, and other fibrous substances.—Sealed 13th April.

Matthias Nicolas La Roche Barre, of St. Martin's-lane, in the county of Middlesex, manufacturer of cotton, for an improvement in the manufacture of a fabric applicable to sails and other purposes.—Sealed 19th April.

Reuben Partridge, of Cowper-street, Finsbury, in the county of Middlesex, engineer, for certain improvements in machinery or apparatus for splitting and shaping wood into splints, for the manufacture of matches and other similar forms.—Sealed 20th April.

Richard Dover Chatterton, of Derby, in the county of Derby, Gent., for certain improvements in propelling.—Sealed 22nd April.

Theophile Anton Wilhelm Count de Hompesch, of Burich Castle, near Aix la Chapelle, in the Kingdom of Prussia, for improvements in obtaining oils and other products from bituminous matters, and in purifying or rectifying oils obtained from such matters.—Sealed 22nd April.

New Patents

SEALED IN ENGLAND.

1842.

To Joseph Clisild Daniell, of Tiverton Mills, near Bath, for improvements in making and preparing food for cattle.—Sealed 31st March—6 months for enrolment.

Julius Seybel, of Golden-square, Middlesex, chemist, for improvements in the manufacture of sulphate of soda and chlorine.—Sealed 31st March—6 months for enrolment.

William Liversidge Trippett, of Charlton-upon-Medlock, Lancaster, agent, for improvements in looms for weaving by hand or by power.—Sealed 31st March—6 months for enrolment.

John Bevan, of Whitehead's-grove, Chelsea, Gent., for an improved mode of expelling the air from certain cases or vessels, used for the preservation of various articles of food.—Sealed 6th April—6 months for enrolment.

James Smith, of Deanston Works, Kilmadock, Perth, cotton spinner, and James Buchanan, of the city of Glasgow, merchant, for certain improvements applicable to the preparing and spinning of cotton, wool, flax, hemp, and other fibrous substances.—Sealed 6th April—6 months for enrolment.

John Read, of Regent's Circus, mechanist; Henry Puland, of Hurst Green, Sussex, farmer; and Charles Woods, of Fore-

street, Cripplegate, commercial traveller, for improvements in the construction and make of driving reins, harness, bridles, and reins, and in bridles and reins for riding.—Sealed 6th April—6 months for inrolment.

Jean George Sire Clarke, of Euston-grove, engineer, for improvements in supplying and regulating air to the furnaces of locomotive engines,—being a communication.—Sealed 6th April—6 months for inrolment.

Thomas Clive, of Birmingham, iron-founder, for certain improvements in the construction of candlesticks.—Sealed 7th April—6 months for inrolment.

John Anthony Tielens, of Fenchurch-street, merchant, for improvements in machinery or apparatus for knitting,—being a communication.—Sealed 7th April—6 months for inrolment.

Marc Carlotti, of Little Argyle-street, Regent-street, Gent., for certain improvements in the construction and manufacture of boots, half-boots, shoes, clogs, and galoshes,—being a communication.—Sealed 8th May—6 months for inrolment.

William Falconer, of Clapham Common, Gent., for improvements in apparatus for attaching buttons and fasteners to gloves and parts of garments.—Sealed 13th April—6 months for inrolment.

John Byron Dawes, of Trafalgar-square, Charing-cross, Middlesex, Gent., for a certain improved chemical composition or compositions, to be employed in the preparation of glass or other media of light.—Sealed 15th April—6 months for inrolment.

John Lamb, of Kidderminster, machinist, for improvements in engines to be worked by steam, air, gas, or vapours, which improvements are also applicable to pumps for raising or forcing water, air, or other fluids.—Sealed 15th April—6 months for inrolment.

Thomas Richards, of Liverpool, book-binder, for certain im-

provements in the art of book-binding, and also in machinery or apparatus to be employed therein.—Sealed 15th April—6 months for enrolment.

Alfred Jeffery, of Lloyd's-street, Pentonville, Gent., for a new method of preparing masts, spars, and other wood, for ship-building and other purposes.—Sealed 15th April—6 months for enrolment.

Charles Farina, of Leicester-square, chemist, for a new method of manufacturing soap, candles, and sealing-wax.—Sealed 15th April—6 months for enrolment.

Kent Kingdon, of Exeter, cabinet-maker, for certain improvements in impressing and embossing patterns on silk, cotton, and other woven or felted fabrics.—Sealed 21st April—6 months for enrolment.

William Noel, of Jermyn-street, St. James's, boot and shoemaker, for certain improvements in the manufacture of boots and shoes.—Sealed 21st April—6 months for enrolment.

Alphonse de Troisbrioux, of Great Russell-street, Bloomsbury, Gent., for improvements in lithographic and other printing-presses,—being a communication.—Sealed 21st April—6 months for enrolment.

Otto Rotton, of Gracechurch-street, Doctor of Medicine, for certain improvements in machinery or apparatus for spinning cotton, wool, silk, and other fibrous substances,—being a communication.—Sealed 26th April—6 months for enrolment.

William Wood, of Wilton, manufacturer, for a new mode of weaving carpeting and other figured fabrics.—Sealed 26th April—6 months for enrolment.

Septimus Cocking, of Birmingham, draftsman, for certain improvements in the production of light, by the burning of oil, tallow, and wax, and in the apparatus for regulating and extinguishing the same,—being partly a communication.—Sealed 26th April—6 months for enrolment.

Raoul Armand Joseph Jean Comte de la Chatré, of Leicester-square, **Richard Tappin Claridge**, of Weymouth-street, Gent., and **Richard Hodgson**, of Salisbury-street, Strand, Gent., for improvements in preparing surfaces of fabrics, to be used in covering roofs, floors, and other surfaces,—being a communication.—Sealed 26th April—6 months for inrolment.

Henry Robinson Palmer, of Great George-street, Westminster, civil engineer, for an improvement or improvements in the construction of roofs and other parts of buildings; and also for the application of corrugated plates or sheets of metal to certain purposes, for which such sheets or plates have not heretofore been used.—Sealed 26th April—6 months for inrolment.

Joseph Megé, of Keppel-street, Russell-square, merchant, for improvements in the making or constructing of trousers,—being a communication.—Sealed 26th April—6 months for inrolment.

John Henry Pape, of Grosvenor-street, Bond-street, piano-forte maker, for improvements in carriages, and in the construction of wheels.—Sealed 28th April—6 months for inrolment.

John Varley, of Colne, Lancashire, engineer and **Edmondson Varley**, of the same place, cotton manufacturer, for certain improvements in steam-engines.—Sealed 28th April—6 months for inrolment.

William Losh, of Newcastle-on-Tyne, Esq., for improvements in the construction of wheels for carriages and locomotive engines, intended to be employed on railways.—Sealed 28th April—6 months for inrolment.

CELESTIAL PHENOMENA for May, 1842.

D. H. M.	
1	Clock after the sun 3m. 2a.
—	☿ rises 1h. 9m. M.
—	☿ passes mer. 5h. 17m. M.
—	☿ sets 9h. 32m. A.
2 0 46	☿ in ☐ or last quarter.
2 5 43	♀ in conj. with ☿ diff. of dec. 0. 18. N.
6 53	♀ in conj. with Ceres, diff. of dec. 2. 48. S.
8	♂ in conj. with Ceres, diff. of dec. 3. 6. S.
3 7	☿ in Apogee.
4 15 57	♃'s fourth satt. will im.
5	Clock after the sun 3m. 29a.
—	☿ rises 2h. 18m. M.
—	☿ passes mer. 8h. 7m. M.
—	☿ sets 2h. 10m. A.
—	Occul ♀ Piscium, im. 14h. 9m. em. 15h. 1m.
6 0 52	Her. in conj. with the ☿ diff. of dec. 5. 50. S.
14 56	♃'s first satt. will im.
9 18 22	♀ in the ascending node.
10	Clock after the sun, 3m. 49a.
—	☿ rises 3h. 43m. M.
—	☿ passes mer. 11h. 51m. M.
—	☿ sets 9h. 28m. A.
1 32	♀ in conj. with the ☿ diff. of dec. 4. 36. S.
7 8	♀ in sup. conj. with the ☉
9 2	♃ stationary
11 38	Ecliptic conj. or ☉ new moon.
12 48	♃'s third satt. will em.
11 1 17	♂ in conj. with the ☿ diff. of dec. 3. 27. S.
9 55	♀ in conj. with the ☿ diff. of dec. 3. 8. S.
12 17 39	♀ in conj. with Vesta, diff. of dec. 2. 59. S.
14	Occul ♀ Geminorum, im. 7h. 42m. em. 8h. 35m.
14 7 54	♃ in Perihelion
15	Clock after the sun, 3m. 55a.
—	☿ rises 8h. 31m. M.
—	☿ passes mer. 4h. 39m. A.
—	☿ sets Morn.
16 5	♀ in conj. with Ceres, diff. of dec. 3. 25. N.
17	Mercury R. A. 4h. 8m. dec. 22. 11. N.
—	Venus R. A. 4h. 53m. dec. 23. 15. N.
—	Mars R. A. 4h. 20m. dec. 21. 59. N.

D. H. M.	
—	Vesta R. A. 4h. 38m. dec. 19. 47. N.
—	Juno R. A. 16h. 25m. dec. 3. 50. S.
—	Pallas R. A. 2h. 14m. dec. 1. 7. S.
—	Ceres R. A. 4h. 2m. dec. 18. 26. N.
—	Jupiter R. A. 19h. 37m. dec. 21. 41. S.
—	Saturn R. A. 19h. 0m. dec. 22. 8. S.
—	Georg. R. A. 23h. 52m. dec. 1. 41. S.
—	Mercury passes mer. 0h. 29m.
—	Venus passes mer. 1h. 14m.
—	Mars passes mer. 0h. 41m.
—	Jupiter passes mer. 15h. 56m.
—	Saturn passes mer. 15h. 18m.
10	☿ in ☐ or first quarter.
13 37	♃'s third satt. will im.
22	☿ in Perigee.
19 3 22	♀ in conj. with ☿ diff. of dec. 1. 0. N.
20	Clock after the sun, 3m. 47a.
—	☿ rises, 3h. 28m. A.
—	☿ passes mer. 8h. 51m. A.
—	☿ sets 1h. 42m. M.
21 10 35	♀ in conj. with Vesta, diff. of dec. 4. 2. N.
11 56	♃'s second satt. will im.
22 13 13	♃'s first satt. will im.
24 9 39	Ecliptic oppo. or ☉ full moon
24 13 31	Juno in oppo. to the ☉ intens. of light 0.321
16	♂ greatest Hel. Lat. N.
25	Clock after the sun, 3m. 26a.
—	☿ rises, 9h. 48m. A.
—	☿ passes mer. 0h. 27m. M.
—	☿ sets, 4h. 4m. M.
26	Occul ♀ Sagittarii, im. 14h. 30m. em. 15h. 36m.
27 1 9	♃ in conj. with the ☿ diff. of dec. 1. 19. N.
18 17	♃ in conj. with the ☿ diff. of dec. 0. 13. S.
28	Occul ♂ Capricorni, im. 15h. 43m. em. 16h. 37m.
28 2 55	Ceres in conj. with the ☉
23 14 30	♃'s second satt. will im.
29 15 7	♃'s first satt will im.
31 3	☿ in Apogee.

J. LEWTHWAITE, Rotherhithe.

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Recent Patents.

To ROBERT WILLIAM SIEVIER, of Henrietta-street, Cavendish-square, in the county of Middlesex, Gent., for certain improvements in looms for weaving, and in the mode or method of producing figured goods or fabrics.
—[Sealed 6th August, 1838.]

THIS invention applies, firstly, to figuring looms generally, but more particularly to those looms in which several pieces or breadths of narrow work are produced at one time; and secondly, to a novel mode of producing raised figures on woven goods or fabrics, without the aid of tags or wires, which are usually employed in the weaving of coach-lace, velvets, and other articles, having the pattern or surface raised above the ground of the fabric.

As respects the loom, the particular features of novelty are, raising and depressing the breast-beam and warp, and raising and depressing the batten or slay and shuttles, either separately or together. These improvements are

applicable solely to such looms as are furnished with two or more shuttle-races in one batten, situated one above another, in which the shuttles act, carrying different weft threads, intended to be woven into one warp. By these movements of the breast-beam and warp-threads, or of the batten and shuttles, the warp may be brought at pleasure into operation with one or other of the rows or tiers of shuttles, and their weft-threads, as required, to produce the pattern upon the fabric; the rising or falling movement of the warp-threads, when the batten remains as in common, (that is, without rising or falling,) causing them to take the weft or shoot from either of the rows or tiers of shuttles, which may thus be brought into action with them; or when the batten and the rows or tiers of shuttles are made to move upwards and downwards, (the warp-threads remaining and acting in the common way,) the warp-threads receive the weft from that particular row or series of shuttles brought into operation with them, according to the colour or pattern desired; that is to say, in the first case, the warp-threads move up or down to take the weft or shoot of the particular row or series of shuttles as required for the pattern; and in the second case, the batten and shuttles move up or down, so that the particular row or tier of shuttles may give its shoot or weft to the warp-threads, as required for the design; or both of these movements may be brought into operation in one loom, if desired.

As respects the fabric to be woven, the novelty consists in raising up in ribs the figure, previously woven flat, upon the surface of the goods, by causing the fabric to be shrunken.—This is done by allowing the pattern parts of the warp to float or lay over two or more shoots of the weft, the warp having strands of India-rubber introduced among its threads. The fabric so produced, will, in the first instance, have the figure lying flat upon its surface,

but by the application of heat, the India-rubber strands will contract and cause the warp-threads to be drawn up or puckered, so as to bring up the pattern upon the surface into ribs, having exactly the character of a fabric in which the pattern or figure is produced by weaving over tags or wires.

In Plate XIII., fig. 1, is a front elevation of a power-loom, constructed and arranged for making several breadths of webbing, with the first improvement adapted thereto, there being only two rows or tiers of shuttles shewn, in order that the movements of the mechanism may be more easily understood. In this arrangement, the warp-threads and breast-beam have the rising and falling motion given to them, the batten and shuttles acting according to their usual movements. Fig. 2, is an elevation of the right-hand end of the loom; fig. 3, is a transverse vertical section of the same; fig. 4, is a front view; and fig. 5, a section of a portion of the batten, on an enlarged scale, shewing the two rows or tiers of shuttles.

In the former figures A, A, is the ordinary frame-work of the loom; B, the harness for opening and closing the warps, passing in the usual way through the comber-board D, from the Jacquard placed at the top of the loom. The Jacquard, forming no part of these improvements, is not shewn in the drawings; E, is the batten, with the reed and shuttles suspended by the swords or pendulous levers F, in the usual manner, and is moved to and fro to beat up the weft, by the connecting rods and cranks G, on the main shaft H.

The row or series of shuttles I, I, carries one weft; K, is the other row, carrying the other weft-threads. These shuttles have the usual motions in the races given to them to throw the shoot, by means of the long racks M, and pinions C, which take into other racks formed on the shuttles. The racks M, are set in motion by the cords and

levers *n*, and *o*, which are alternately raised and depressed by the tappets or cams *p*, on the shaft *q*,—the to-and-fro movement being thereby communicated to the shuttles; there being in this arrangement a pair of tappets *p*, and levers *n*, *o*, to each row of shuttles.

The shaft of the tappet-cams must revolve at a speed suited to that of the crank-shaft *H*, in order that a movement of the shuttles may be given between each beat of the batten. With two rows of shuttles there would be four levers and tappets; consequently the shafts *q*, and *H*, would be geared to each other, so as to perform four revolutions to one. *r*, is one of the warp-bobbins, and *s*, another warp; *t*, the warp, for the selvage or edges of the piece. All these warps are kept in tension in the usual way. *v*, is the cam for working the Jacquard, mounted on the main shaft, and acts upon an anti-friction roller on the lever *w*. One end of this lever turns on a pin attached to the frame-work, and the other is connected by the rod *x*, to the Jacquard.

The cam and lever are shewn by dots in fig. 3, to prevent their hiding other parts of the loom. The warps from the bobbins *s*, and *t*, are passed over the beam *a*, and the other warp over the smaller beam *b*. The beam *a*, is mounted on arms, projecting from the frame-work, capable of turning in bearings, and carries the small beam *b*, by arms projecting therefrom. To the beam *a*, is securely attached one end of the long levers *c*, *c*, their other ends carrying the breast-beam *d*, and tension work-beam *e*, over which the woven fabric *f*, *f*, is passed to the work-rollers *u*, *u**; the warps and breast-beam are raised and lowered, at the periods desired, by the following means:—

Upon the shaft *q*, is mounted the double cam or tappet *g*, which acts upon the anti-friction roller of the lever *h*, the end of which is connected by a rod *i*, to the weighted lever-arm *k*, of the rocking-beam *l*. Other arms *m*, *m*,

extend from the rocking-beam, to which are attached the rods *n, n*, connected to the breast-beam *d*, so that, on the lever *h*, being depressed by the tappet-cam *g*, the breast-beam will be raised; and as the tappet passes from the anti-friction roller, the breast-beam and warp will be allowed to descend. The weight of the breast-beam *d*, *e*, and lever *c*, are counter-balanced, partly by the tension of the warps and the woven fabric, and partly by the weight *o*, on the lever *k*.

The pieces or breadths of woven fabric are drawn from the loom by the ordinary taking-off motion *r*, placed at the end of the work-roller *u**. The woven fabric is conducted under the feet of the workman, and passed over rods and kept stretched by a pendant weight, as shewn in fig. 3. In order that the warps may be kept at a proper tension, during the time they are raised or lowered by the ascent or descent of the breast-beam, the rods should be so arranged that their movements will compensate one with the other.

When only two rows or tiers of shuttles are adapted to the loom, there will be but a small upward and downward movement of the warp, and therefore these parts may be constructed and arranged, as shewn in the figures; that is, the lever *c*, carrying the beams *d*, and *e*, by the rigid cross-piece at their ends; but when three or more rows of shuttles are adapted and applied to the loom, the movements of the warp and breast-beam will be more extensive, and the parts should be constructed as shewn in the diagram, fig. 6, the end of the lever *e*, only carrying the breast-beam *d*, at which point they are jointed to a rod or connecting-piece *p*, which is attached by a hinge-joint to the lever *q*; at which joint is placed the rod *e*; the other end of the lever *q*, has its fulcrum *r*, stationary on the frame-work; and at this point the beam *r*, is placed, from whence the fabric may be led off in any way desired.

The movements of the parts *q*, *p*, *c*, will preserve the same degree of tension on the warps and fabric; the distance the beams *r*, *e*, and *d*, are from one another being at all times the same, and therefore the warps may be raised or lowered to the required distance, for three or more shuttles, without altering the tension of the warp or the woven fabric.

The motion of the parts of the loom, in taking the weft from either one or other of the rows or tiers of shuttles, is as follows:—

Suppose the warps to be opposite the row of shuttles *1*, immediately after the shuttles have passed between the sheds or warps, they are made to close or open again by the ordinary movements of the loom, as they rise opposite the shuttle *x*; this will be effected by one of the tappets *g*, coming into action on the lever *h*, and raising the breast-beam and warp, as before described; the warps will then be open and stand opposite the row of shuttles *x*, when they will immediately throw their shoot of weft between the warps, which will be made to close upon it, and open again as they descend, by the tappet *g*, receding from the lever *h*; and when they again arrive opposite the shuttles *1*, they will be open ready to receive another shoot of weft from the shuttles *x*, and so on, alternately rising and falling to receive the alternate weft-threads.

It will be seen, that the tappets *g*, cause the warp to take alternate shoots of weft from the rows of shuttles; but there may be more or differently timed tappets upon the shaft *a*, so as to take the wefts from the rows of shuttles, in different proportions.

Fig. 6, is a diagram or partial view, shewing another arrangement of parts for getting the rising and falling motion of the warps, either for two or three rows or tiers of shuttles. In this instance the warps are raised and

lowered by a tappet or cam-wheel *s*, acting upon the lever *c*; and when only two sets of shuttles are used, the tappet-wheel may act direct upon a pin *t*, or roller, projecting from the levers *c*; but when three rows of shuttles are used, there must be some contrivance placed between the tappets *s*, and levers *c*, which will keep them and the warps raised up, so as to work with the higher row or tier of shuttles, and thus take the proper number of shoots of weft from that row of shuttles, as required by the pattern.

1, is a lever, having the tappet 2, on its end, which is acted upon by the wheel *s*. The parts are shewn in the position they would be in when working with the lower and middle tier of shuttles; but when the warp is to be brought into operation with the upper row of shuttles, the levers *c*, are lifted by the action of the Jacquard, through the rod 3, which may be done by one of the cards having a hole pierced in it to take a hook, and lift the levers *c*, at the same time it lifts the figure pattern. As soon as the Jacquard has raised the levers *c*, and warps, the pall or catch-piece 7, is forced by its spring 8, under the end of the projecting piece *t*, on the lever *c*, and the warps will thus be kept raised, and work with the upper and middle row of shuttles.

At the period required, according to the figure, a hole pierced in one of the cards, will cause the Jacquard to lift the wire 9, and by means of the bell-crank 10, draw the catch 7, from under the piece *t*, when the levers *c*, and warps, will fall into their former position, and work with the lower tier of shuttles.

The manner in which three or more rows of shuttles may be worked in one batten, is shewn at fig. 7, which is a section of a batten with three rows of shuttles *A*, *B*, *C*, worked by one rack *a*, *a*, supported upon rollers *b*, *b*; this rack turns the pinions *c*, *c*, which take into the racks *d*, of the lower

row of shuttles *A*, thereby give them the required motion. The axles of the pinions *c*, turn in bearings in the batten, and carry other larger pinions *e*, in gear with other pinions *f*, on the axles of the pinions *g*, which belong to the middle tier of shuttles *B*; and the back pinions *f*, take into gear with other pinions *h*, which put in motion the pinions *i*, of the top row of shuttles.

Two other modes of actuating the shuttles are shewn :— One mode consists in using, for that purpose, “ strikers ” or “ flyers,” fixed to a rod, which extends across the front of the loom, and is put in motion at the end of the batten, in the ordinary way. The other mode is somewhat similar to that shewn in fig. 7; but, in this case, the two lower rows of shuttles have racks upon both their upper and under sides; and hence, by their pinions, (three in number, corresponding to the pinions *c*, *g*, *i*, in fig. 7,) communicate motion to each other, without the intervention of the back pinions *e*, *f*, *h*.

It will be seen, that although all the rows of shuttles are in motion at one time, yet only the one in action with the warp will give out its weft.

The raising and lowering of the batten and shuttles may be accomplished by mounting the pivots of its swords or levers *F*, in slots and moveable bearings, and raising or lowering them, at the required times, by cams and levers.

Fig. 8, is a partial section of a loom, shewing how this may be effected. The axle *a*, of the sword *F*, is mounted in the slot-bearing *b*, placed on the top of the frame-work; *c*, is one of the two rods, placed at each end of the loom, and sliding in proper guide-bearings *d*. These rods are connected to the ends of the axis *a*, of the swords, their lower ends carrying anti-friction rollers *e*, which are acted upon by cams *f*, placed on a shaft *g*, extending lengthwise of the loom. This shaft is mounted in proper bearings,

and is set in motion by suitable gear-work. The cams *f*, are formed so as to act upon the rods *c*, and raise the swords and batten; but if the cords *n*, which actuate the racks of the shuttles, are attached to the lever *N*, as in the former instance, then, whenever the batten is raised, the cords would be slackened, and unable to give the required movement to the shuttles. In order to obviate this, cords *i, i*, are attached to the sword *F*, of the batten, and to the ends of the levers *N, N*, so that the cords *n*, will not be allowed to slacken when the batten rises or falls.

Fig. 9, is a cross section of a batten, shewing a method of raising and depressing the three rows of shuttles therein, so that either row may give weft to the warp, as required by the pattern, without causing the warp or the batten to move out of their usual course. *A, B, C*, are the rows of shuttles in their race *D*, which is made to move up and down within the batten *E*, by a rod *F*, attached thereto, and moved by cams and levers, such cams having tappets, rising and falling, and thus changing the shuttles, as required by the figure. The shuttle-race is kept in its proper situation by guide-rods *G*, passing through loops *H*, on the back of the race. The shuttles are driven, in the usual way, by the strikers or flyers *I*.

The patentee claims, under this head of his invention, giving to the breast-beam and warps, or to the batten and rows of shuttles, or to either of them, the rising and falling motion, by any convenient mechanism, for the purpose of bringing the warp into action and operation with either of such rows or tiers of shuttles, as required by the pattern or fabric.

The improved mode of producing raised figures on woven goods, without the aid of tags or wires, may be effected either in the loom above described, or in an ordinary loom, by the introduction of threads of India-rubber into the warp,

in the same manner as in weaving some kinds of elastic webbing. The India-rubber is first cut into threads, of the required substance, by any of the ordinary cutting apparatus, and is then put into warm water, and stretched out to its utmost tension, in the act of winding it upon a reel or drum; and in this state it is left for about twenty-four hours, when it will be found to have become fixed at its extended length; it is then wound off the drum or reel, and has a thread of silk or other filament, coiled spirally or platted round it, by the operation of a winding-on or a spiral covering machine, or platting machine; these threads are merely to prevent the filament of India-rubber from fraying in the operation of weaving. The India-rubber threads, so prepared, are then wound upon small bobbins, and placed in the loom, to form part of the warp-threads, and are woven into the body of the fabric.

The warp for each breadth of fabric may be constituted of the threads from five separate bobbins, as shewn in the diagram, fig. 10. The bobbin *a*, carries the India-rubber threads; the bobbins *b*, threads, when a round edge is required instead of a plain selvage; the bobbin *c*, carries the warp, from which the raised figure is produced; the bobbin *d*, carries the warp-yarns, for constituting the back of the fabric; and the bobbin *e*, those portions of the warp which are used for the binders to assist in connecting the whole fabric together, when interwoven with the weft-threads. These bobbins are placed on a stage or framework, at the back of the loom, and the several portions of the warp are raised and depressed, through the agency of the Jacquard apparatus; or the same may be done by a draw-boy, or any other suitable means.

The operation of weaving raised figures, without the aid of tags or wires, is as follows:—

First,—One-half, that is, every alternate thread of the

warp, for the back of the fabric, is raised with every alternate thread of the binder-warp; the shuttle and weft then pass through the sheds, and these warps descend by the motion of the loom. Second,—The same half of the binder-warp must now be raised with one-half; that is, the alternate threads of the figure-warp, or that portion which may be necessary to form the figure. The shuttle and weft again pass through the sheds, and the warp descends as before. Third,—The other or remaining half of the warp of the back and binder-threads now rise; the shuttle and weft pass again, and the warp descends. Fourth,—The same half of figure-warp as described second, and the binder-warp as third, now rise; the shuttle and weft pass through the sheds, and they again close.—This completes one loop or row of the pattern.

The same operation goes on, with this difference:—The half of the pattern-warp, or that part which is necessary for the figure, that has been laying below, now performs the same number of rises, and with the same lifts as have been made by the previous half of the figure-warp. This change, from one to the other half of the figure-warp, or that part which is necessary to the figure, takes place alternately with the other warps above described, until the piece is woven.

The India-rubber warp rises and falls, so as to have the weft pass under and over it, to weave it between the two parts constituting the top or face of the work and its back.

The edge-warp and bobbins may be used when a round or fancy-edge is required, or be dispensed with at the will of the weaver.

The web, when so woven, is firm and compact, the India-rubber threads lying in lines between the front and back and binding-threads, the figure-warp lying on the surface or front, and floating or lying over two shoots of the weft.

That part of the figure-warp, not required for the production of the figure on the face, lies between the front and back, with the India-rubber.

Under this head the patentee claims weaving with India-rubber and other strands, so as to produce a raised figure, by the simple application of heat to the India-rubber when so woven, in order to contract the fabric, and cause it to resemble a figured fabric, similar to that heretofore woven upon tags or wires, and which is suitable for all purposes of coach-lace or other goods, in which tags or wires have been used in weaving.—[*Inrolled in the Rolls Chapel Office, February, 1839.*]

Specification drawn by Messrs. Newton and Son.

To EDWARD JOHN CARPENTER, of Toft Monks, in the county of Norfolk, a Commander in the Royal Navy, for improvements in the application of machinery for assisting vessels in performing certain evolutions upon the water, especially tacking, veering, steering, coasting, or winding, and backing astern.—[Sealed 13th June, 1840.]

THIS invention may be divided into three distinct parts, consisting, firstly, in the method in which the improved propelling apparatus is affixed and adjusted, for propelling ships or vessels, with reference to the use of sub-marine rotatory propellers on the quarter; secondly, for a method of applying and adjusting the improved propelling apparatus, so as to turn ships or vessels about, in various positions, without the assistance of the wind or rudder; and thirdly, for a method of affixing and applying the propelling apparatus to ships or vessels, with one propeller at the stern.

In Plate XIV., figs. 1, 2, 3, and 4, represent views of the blades and screws, which form the sub-marine quarter propeller. They may be constructed either of metal or wood, or any other suitable material. Their strength and surfaces depend upon the size and weight of the vessel to be propelled.

Figs. 1 and 2, are planes, which act in the water on the principle of the wedge and screw; figs. 3 and 4, are sections of screws, which act in the water on the principle of that power, the water being the nut or resisting medium, and the propeller the screw; fig. 5, represents a partial side elevation of the after part or quarter of a vessel, with the improved apparatus, adjusted according to the first part of this invention; fig. 6, represents the stern of a vessel, with the apparatus affixed; and fig. 7, represents a side view of the quarter propellers, and the regulator, and stern-bearing, on an enlarged scale.

The spindles *i, i*, consist of moveable axles, which protrude through the vessel on both quarters, at the point *g*, near the line of floatation, below the load water-line, and above the keel, between the mid-ship section and the stern-frame. The spindles are enclosed by metallic cylinders or other proper packing *h*, having a cup and socket valve and stuffing-box at one or both ends; they are firmly secured to the timbers of the vessel, by means of iron or other fastenings.

That part of the spindle which is within the vessel, is to be connected to a steam-engine or first mover, by means of a connecting-shaft, excentric rods, bands, or other convenient mechanical contrivances. The outer part of the spindle is connected with the propelling shaft, by means of an universal or other suitable joint or junction *f*, or hinge, to allow the propeller-shaft to be detached or raised conveniently. *e*, is a regulator, and consists of a rod, furnished with a rack and pinion at its upper end; at the

bottom of the rod is a pendant bearing, through which the propelling-shaft passes; and thus, by turning the pinion, the shaft and propeller is raised and lowered as circumstances may require; or the regulator may be formed of a chain and tackle, if thought desirable.

The end or stern-bearing *c*, is a metal arm, bolted firmly into the timbers of the vessel, so that it is capable of resisting the force of heavy seas against the propeller, and also of being easily detached, as circumstances may require. Two or more bearings may also be applied in this way, if required. The ends of the propeller-shaft turn in the bearings at *b*.

The second part of the invention is shewn at fig. 8, which represents the cross section of a vessel. *a*, is the capstan; *b*, a bevelled wheel, fitted upon the capstan, for the purpose of communicating the motive power to the propellers; *c, c*, are two pinions in gear with the large bevil-wheel.

The axle of the pinions is connected with the spindles *d, d*. Fig. 9, represents the quarter section of a vessel, shewing the position of a quarter propeller on the larboard side, the shaft passing out from the vessel, at an angle of sixty degrees with the line of the keel from the stern. The propeller *e*, is supposed to be entirely immersed and confined in its position by means of a stay, and other parts of the apparatus, as seen in the drawing. The shaft rotates in a bearing *g*, and it can be raised up or lowered into the water by means of a topping-lift or tackle *h*, a joint *i*, and a hinged bracket *k*. After the apparatus has been coupled together, and connected with the capstan, it is only necessary to turn the capstan round by power, and the ship or vessel's head will move round in an opposite direction to that line in which the force is applied, according to the position of the propellers, whether one or both are used in this instance.

The third part of this invention consists in the manner

in which the rudder is divided, so as to allow the shaft of a single propeller to pass through it, and also in the form of the vanes or blades to be applied to this shaft, which are shewn at figs. 10, 11, 12, and 13. The length of each vane or blade *a, b*, being more than twice its radius *c, d*. The outer segmental line *a, b*, being the arc of a circle, of such a diameter, that every part of it will be equi-distant from the centre of the shaft, according to the angle at which it is placed. Two of these blades being placed angularly upon the shaft, as before described, in reference to the quarter propellers.

Fig. 14, is a side view of a vessel, shewing the rudder divided into two parts *e, f*, with the jointed propeller-shaft *g, h*, passing through it. This shaft is supported at its extremity by a hinged bearing *c*, as before described, with a regulator or topping-lift, as may be required for raising it out of the water. The upper and lower division of the rudder are united by a strong iron connecting-piece *i, k*.

The patentee claims the application or adaptation of sub-marine propellers, in the manner above described, in whatever situation such propellers may be placed, and likewise the peculiar form of the propellers, shewn in the drawings, in whatever way they may be used.—[*Inrolled at the Petty Bag Office, December, 1840.*]

Specification drawn by Messrs. Newton and Son.

To THOMAS FULLER, of Salford, in the county of Lancaster, machine-maker, for certain improvements in machinery or apparatus, for combing or preparing wool or other fibrous substances,—being partly a communication.—[Sealed 8th February, 1841.]

THESE improvements in machinery or apparatus for combing or preparing wool or other fibrous substances, apply to

a peculiar kind of machine, known to manufacturers as Platt's "double circular wool combing machine," for which he obtained a patent in 1827*, in which two circular combs are employed, their axles being placed obliquely to the horizon, and at opposite angles to each other. The teeth, pins, points, or (as they are technically termed) broaches of these circular combs, are described in his specification as placed "nearly perpendicular, or at right angles to the plane on which the combs are intended to move or revolve;" that is, the points are set in the faces of the circular rims or wheels, in positions parallel to the axle, "but inclining a little inward."

The present improvements consist, firstly, in setting the teeth, pins, points, or broaches of the circular combs in the faces of the comb-wheels, in positions forming acute angles with the axis of these wheels; and secondly, adapting drawing rollers to the machine, in such positions as shall enable them to draw the fibres of the material, under operation, from the points or broaches of the delivering comb-wheel, with better effect than has heretofore been obtained by the employment of the old machines.

These features of improvements will be more fully understood by reference to the drawings in Plate XIII., in which fig. 1, represents a geometrical elevation of the side of the improved machine; and fig. 2, an end elevation. Fig. 3, is a transverse section of one of the circular combs, taken through the periphery of the wheel in the direction of its diameter, and through one of its hollow arms; the teeth, pins, points, or broaches, being inserted through the flange or rim round the periphery; and, in this example, four ranges of points are shewn fixed side by side; but there may be a greater or less number, as circumstances may require.

* For description of this invention, see Vol. VII., Second Series of the London Journal of Arts and Sciences, p. 68.

The framing of the machinery is shewn at *a, a*, supporting, in pedestals or bearings, the hollow steam-axles *b, b*, upon which are mounted the hollow circular comb-wheels or rims *c, c*; into the rims of these wheels, the combs, pins, points, or broaches *d, d*, are inserted, standing at or near the angle of 15° from the axis, instead of being nearly perpendicular, or at right angles to the plane on which the combs are intended to move or revolve, as heretofore used. The driving strap pulleys *e, e*, are fast upon each of the respective axles *b, b*, and are to be driven at proper intervals, (as hereafter explained,) by means of the open strap *f*, and crossed strap *g*, in order that the circular comb-wheels *c, c*, may be caused to revolve in opposite directions when performing the operation of combing. It will be observed, in fig. 1, that these driving straps *f*, and *g*, are represented loose upon their pulleys *e, e*, and the machinery is supposed to be in a state of rest.

When the operation of combing is to be performed, the wool or other fibrous substance is supplied or fed on to the pins of the comb-wheel by the hands of the operators, who are situated at the ends of the machine under the framing; and as the wool is placed upon the teeth of the comb-wheels *c, c*, by one hand of the workman, the rims or wheels are gently pulled round by the other hand, until the combs *c, c*, are completely charged with wool all round, when the swing frames *h, h*, with their tension pullies *i, i*, are thrown over, and thus, the driving-straps *f*, and *g*, are tightened upon their respective drums, which now begin to revolve and drive the circular combs, charged with wool, round in opposite directions. These revolving circular combs are now caused slowly to approach each other, until their respective rims of teeth are nearly in contact, in order to comb the wool effectually. This is accomplished either by any mechanical arrangement, in connection with

the working parts of the apparatus driving the worm *k*, or by the hand of the operator, whichever may be preferred. The hand lever *l*, *l*, is to be pulled over into the opposite position, as shewn by dotted lines in fig. 1, and with it the toothed quadrant *m*, *m*, which, by depressing the crank arm *n*, and connecting rod *o*, *o*, will draw the parallel motion *p*, *p*, into the contracted position, also shewn by dotted lines in the figure, and by means of the connecting arms *q*, *q*, draw the two comb wheels *c*, *c*, into close contact, as also shewn by dots in this figure.

Thus, it will be observed, that all the above described operations of the machinery are exactly the same as those heretofore employed for such purposes, and that the present improvement of placing the teeth *d*, *d*, of the comb-wheels at considerable angles to the axis of the wheel, causes them to assume nearly horizontal positions, where the peripheries of the comb-wheels nearly meet in passing the planes of their centres, at which time, by this improved construction, the operating points or broaches, in both wheels, will be brought into nearly parallel positions, as they pass each other, and cause the wool to be evenly combed by the points, thereby preventing the wool from being torn, broken, or noiled, as occurs in the old construction of machines, where the points pass each other at acute angles.

The old construction of circular combing machines, is also provided with an apparatus at each end, for the purpose of drawing off the slivers from the comb-wheels after the combing operation has been completed. This apparatus, in its improved position, is also represented in the drawings at *r*, *r*, *s*, *s*, and *t*, *t*; that upon the left-hand end of the machine, in fig. 1, being sliddden outwards or in the position it would assume when the comb-wheels are revolving during the operation of combing; and that upon the right-hand end of the machine being sliddden inwards and placed in

contact with the comb-wheel, as it would be when the combing operation has ceased, and the drawing off of the sliver is to be performed.

The second feature of improvement, therefore, is the peculiar adaptation of the drawing-off rollers *r, r*, with their endless bands *s, s*; and carriage *t, t*, to the machinery, in such positions, that is, at angles of about 40° to the horizon, as shall enable them to draw off the fibres which have been combed from the pins or broaches of the comb-wheel, with much better effect than has hitherto been attained by the old machinery.

The patentee claims, firstly, setting the teeth, pins, points, or broaches of circular combs in the face of the comb-wheels, in positions forming acute angles with the axis of these wheels; and secondly, adapting the positions of the drawing rollers to a suitable angle for drawing off the slivers from the comb-wheels, as set forth and exhibited in the drawings attached.—[*Inrolled in the Petty Bag Office, August, 1841.*]

Specification drawn by Messrs. Newton and Son.

To JOHN ROCK DAY, of Great Queen-street, Lincoln's-inn-fields, in the county of Middlesex, sadlers' iron-monger, for certain improvements in the construction of collars for horses and other draught animals.—[Sealed 6th January, 1841.]

THESE improvements consist, firstly, in the adaptation of a peculiar apparatus for fastening the junctions of collars, which expand for the purpose of allowing the animal's head to pass through without obstruction; and secondly, in attaching two ribs of wood as a forewale to the metal frame of the collar, in place of the ordinary tube of leather

stuffed with straw ; and thirdly, in the peculiar construction of arms affixed to the framing of the collar, instead of the draft eye of the ordinary moveable hame to which the tugs of the traces are to be connected ; by means of which improvements, the necessity for the ordinary moveable hames is superseded, and the collar is capable of being made stronger and lighter ; it may also be passed over the animal's head, without being inverted.

In Plate XIV., fig. 1, represents a front view of the improved collar, (suited for a gig horse,) when open or expanded, as about to be passed over the animal's head.

Fig. 2, represents the back part of the metal framing, shewing the box in section, in which the sliding bolt and catch act, which hold the sides of the collar together.

The metal frame *a, a, a*, is made of two pieces of stout plate iron. These pieces are connected at top by a joint pin *b*, on which they are allowed to open or expand.

A segment-formed box *c, c*, is affixed to the back of one of the side frames at bottom, as shewn in fig. 2. To the other side frame at bottom, a curved bolt *d*, is attached by a joint pin *e*. This curved bolt *d*, slides in the segment box *c*, having an enlargement or tooth at its end, which, when the collar is closed, drops into an opening or slot in the under part of the box, and is there held fast, and prevented from rising out of the slot by a spring bolt *f*. Thus, the lower parts of the collar are firmly locked together upon the horse's neck when in use.

In order to remove the collar from the horse's neck, a stud *g*, extending from the spring bolt *f*, must be drawn back, which will release the end of the curved bolt, and allow its tooth to rise up out of the slot, and the bolt to be drawn back in the box, until the tooth comes against a stop *h*, at the end of the box, which prevents the collar being further expanded.

The ribs of wood to constitute the forewale *i, i, i*, of the collar, are cut out to the proper form and attached to the front part of the metal frames *a, a, a*, by screws; they are then covered in front with japaned leather, like the face of the collar, or may be finished with any other suitable material.

The arms, by which the traces are to be connected to the collar, are shewn at *k, k*, and *l, l*. The pieces *k, k*, form extensions from the metal frames *a, a*; they are slightly bent to the curve of the collar, and with the other parts of the metal frame, are enclosed by the padding within the collar. An eye near the end of each arm *k*, projects through the sides of the padding of the collar, for the purpose of receiving a screw pin *m*. The bracket arms *l, l*, are firmly attached to the metal frames *a, a*, by pins passed through small holes in the frames, as seen at *n, n*, fig. 2; but extend outside of the collar, as shewn in fig. 1. The outer ends of these bracket arms *l*, are formed with an eye also, to receive the screw-pin *m*. A tug or eye-piece *p*, attached to the end of each trace, being introduced between these arms *k*, and *l*, is to be made fast thereto by the insertion of the screw-pin *m*, through the three eyes or openings, by which means the horse is enabled to draw from the collar.

When the collar is constructed for one of a pair of horses for a carriage, (having a pole between them,) it will be necessary to attach to the collar a contrivance shewn at fig. 3, which represents the back part of the metal framing of the collar, with the wooden forewale, the box and sliding bolt, and bracket arms, as before described. From the lower parts of the metal frames *a, a*, bent rods *r, r*, of an elliptical form, extend; and to these rods a piece *s*, called the kidney link, is appended, with the ring *t*, for the pole chain. This piece *s*, has elliptical eyes *v, v*, at its ends, and when the collar is to be expanded, in the way

above described, the kidney link is turned up, and the rods *s, r*, are thereby enabled to slide apart through the eyes of the kidney link; but when the collar is closed, as in fig. 3, the link hangs down, and assists in keeping the junctions of the collar together by the eyes *s, s*, bearing against shoulders on the rods *r, r*.

A variation in the construction of the framing of the collar, suited to cart horses, is shewn at fig. 4.

The metal framing *a, a, a*, is connected by a joint *b*, at top, and is open at bottom. The segment box is shewn at *c, c*, exhibiting the curved sliding bolt *d*, working within it. Instead of the spring bolt, which confined the sliding bolt, as before described, a lever *f*, is in this instance employed, which turns upon a pin *e*, fixed in the frame. When the collar is closed, the lever *f*, is raised, and its tail end confined by a pendant link *g*, the nose *i*, of the lever being, by that means, pressed down upon the bolt, so as to confine it, and lock the lower parts of the collar firmly together. But when the collar is expanded, the lever is released, and the curved sliding bolt allowed to slide along in the segment box, until arrested by a stop. Fig. 5, represents the lower part of the framing of the last described figure, as it would appear on the opposite side. In this instance, there are two segment boxes *c*, one fixed on each side of the frame, and there are also two parallel curved sliding bolts, which are employed for the purpose of giving additional strength. Sockets *k, k*, extend from the sides of the frames, to which the tugs for draft are to be attached by pins.

The patentee claims, firstly, the mode of attaching and holding the opening parts of an expanding collar, by means of a curved sliding bolt, acting at the throat part of the collar, in a curved socket, the curved bolt being confined when the collar is closed, by a spring, bolt, wedge, catch,

or lever, made to act upon it at that time; secondly, attaching wooden ribs to the metal frames of the collar as forewales; and thirdly, the novel construction of arms or brackets affixed to the metal framing, to which the tugs or traces are to be attached.—[*Inrolled in the Petty Bag Office, July, 1841.*]

Specification drawn by Messrs. Newton and Son.

To JOSEPH LEESE, Junior, of Manchester, calico-printer, for certain improvements in the art of printing calicoes and other surfaces.—[Sealed 24th June, 1840.]

THESE improvements, in the art of printing calicoes and other surfaces, consist, firstly, in the substitution of a novel description of fabric or material to be employed in the art of printing, instead of the ordinary blanket, felt, or other lappings, now commonly used upon printing machines and tables; and more particularly with reference to printing calicoes, muslins, and other similar woven fabrics; secondly, in a novel arrangement of apparatus, for the purpose of printing calicoes, &c., with blocks, either in combination with the ordinary cylinder printing machine, or separately; thirdly, in a novel construction of mechanism, to be applied to the ordinary calico printing machine, for the purpose of (what is technically called) “rainbowing” colours, in the cylinder printing machine, instead of performing such operation, separately, by hand-blocks, as heretofore; and lastly, substituting a peculiarly prepared fabric, to be used in cutting and forming printing surfaces, either on blocks or cylinders, instead of employing felt, generally used for such purpose.

The first part and main feature of this invention, is as follows:—Instead of using the blanket, felt, or other ordi-

nary bed or lappings, in cylinder or block-printing machines, or on printing tables, a fabric, composed of one, two, or more thicknesses or folds of common calico or other cloth, is used.

Upon and between these folds of cloth, thin layers or coverings of India-rubber solution are spread. The degree of elasticity in thickness, and the strength of the fabric, may be varied to suit the purpose for which it is intended to be used, and will, of course, depend upon the number of layers of cloth and India-rubber, so combined, and also the quality of the fabrics employed; as for instance,—if great strength and considerable elasticity of surface is desired, a piece of stout unbleached calico is coated with India-rubber, and fold laid upon fold, alternately with the layer of India-rubber solution, until the required substance is attained. Or two or three stout pieces of calico, or woollen cloth, or cotton and woollen combined, may be connected by the solution of India-rubber placed between them, thereby producing an adhesion to each other, as firmly as if the fabric had been woven in one piece. This fabric may also have upon its surface a thick layer or coating of India-rubber; and, in this case, the whole endless sheet or blanket, when once united, at its ends, in the printing machine, may readily be washed, without the necessity of unstitching and removing it from the machine.

The advantages of the employment of such improved fabric or material, in place of the ordinary blanket and lappings, in printing, will be evident; first, from the great elasticity of the surface to print upon, which will enable the machine to bring out, or produce from, a very much finer engraving, a superior impression to those usually obtained; and also with much less power or pressure than is commonly required; secondly, this fabric has greater strength and durability, as the layers of India-rubber save

the wear of the cloth, by preventing the friction resulting from the rubbing of threads, one against another; and lastly, its extreme economy or cheapness, compared with the usual cost of blanketing.

The second and third parts of the improvements will be more readily understood by reference to Plate XIV. Fig. 1, represents a side elevation of an arrangement of apparatus, constituting a machine for printing calicoes, &c., to which the above-described material or lapping is particularly applicable, owing to its length never varying, after its utmost tension is attained, and its elasticity being in its thickness only; whereas an ordinary blanket or lapping, could not be effectively employed in a similar arrangement of mechanism, from its liability to stretch, and thus misplace the print and prevent the possibility of fitting the pattern. It consists of stout side-frames *a, a*, (their distance apart being regulated by the width of the goods to be printed,) supporting two cylinders or bowls *b, b*, one at each end; around which the continuous band *c, c*, is passed, and which may then be drawn to its required tension, by means of the screw *d*; the printing cloth or blanket is now ready to receive the cloth to be printed, which may enter the machine at *e*, extending upwards, as at *f, f*; a series of iron arms or frames *g, g*, extend from the main side-frames, and are provided with planed mortices, for the purpose of guiding the printing-blocks *h, h*, which are to be slidden backwards and forwards in them. The frames *g, g*, also support the colour-boxes *i, i*, and the rollers *k, k*, around which the endless sieve-cloths *l, l*, are passed.

The ends of the printing-blocks *h, h*, are fast to the pinions *m, m*, and turn in one end of the slide or working-rods *n, n*; thus it will be seen, that as these rods *n*, are worked or slidden forwards, (either by the hands of the printer, or by any suitable mechanical contrivance,) the

pinion *m*, will, by working in the straight-rack *o*, *o*, underneath, turn over the printing-block *h*, and cause it to strike against the sieve-cloth *l*, and thus be furnished with colour; when, by the rod *n*, being drawn backwards, the printing-block will again be turned over, with its printing surface towards the cloth *f*, *f*, and will print the design or pattern upon it.

It will be seen in the drawing, that a small bed or table *p*, *p*, is placed under the furnishing and printing cloths, in order to prevent any mis-print or sudden concussion of the block. These tables are furnished each with a back or bed-spring *q*, *q*, and have projecting pieces at their ends, for the purpose of guiding the block square on to its work, and prevent one side or end coming first in contact with the cloth; see detached plan view, fig. 2.

The improvement in "rainbowing colours," by machine, will be understood by reference to fig. 3, which is a vertical section, taken through the middle of the machine. *a*, *a*, is the frame of a calico cylinder printing machine, supporting the printing-bowl *b*;—*c*, *c*, is a common surface printing-roller, in the machine; and *d*, *d*, is a stand or frame, supporting the various colour-boxes *e*, *e*. The endless sieve-cloth, for furnishing the colours, is shewn at *f*, *f*, tightly distended over the rollers *g*, *g*.

The several axes *i*, *i*, *i*, *i*, are supported in small adjustable pedestals; upon these axles are mounted discs or rollers *j*, *j*, *j*, which, as they revolve, dip into the colour-boxes, and being furnished with pins or teeth, they thus take up the colours from the colour-boxes, and deposit them upon the sieve-cloth, which furnishes the surface printing-roller. Each of the colour-boxes composing one series, contains a different shade of the same colour, and the discs or rollers *j*, are so placed, that the various shades, when spread on the sieve-cloth, will be abreast of each other;

thus "the rainbowing" is produced, and conveyed to the surface-roller. These discs or rollers *j*, are composed of wood, furnished with copper pins or wires, which are capable of being put up or down, in order to regulate the quantity of colour to be transferred from the colour-boxes to the sieve-cloth; by the travelling motion of which they are respectively driven, the points or wires being in contact therewith.

Another improvement, more particularly adapted to paper printing, consists in winding the paper or fabric to be printed, upon the bowl of the printing machine, instead of its being wound on a roll, and then drawing it through the machine from the back. The bowl of the machine may be made to take in and out, so that there may be more than one in use, and thus delay is prevented.

When the machine is to be set to work, the paper or cloth is wound on the bowl, and the rollers are set up to it, as in printing in the ordinary way; the only difference being, that the diameter of the bowl decreasing, as the paper is printed off it, the rollers must be constantly kept up to it.

The last improvement consists in substituting any fabric after it is coated on one side with India-rubber, for the hating or felt commonly used in coating printing-blocks, and surface-rollers, &c. If the block or surface be required to work a very heavy solid pattern, the whole of the block or surface may be covered with the prepared cloth; the parts not intended to print being afterwards cut out, and if necessary the edges may be coppered, where the blocks are required to work finely.

This part of the improvements consists also in placing at the bottom of the engraving of a deeply-engraved copper cylinder or roller, any suitable cloth or fabric, previously prepared with a coating of India-rubber on one side; the

object of this is to produce an even solid print, and also to furnish a good supply of colour to the piece, the roller being engraved sufficiently deep to allow the doctor to pass over the surface of the roller without touching the surface of the cloth,—[*Inrolled in the Petty Bag Office, December, 1840.*]

Specification drawn by Messrs. Newton and Son.

To JOHN WILKIE, of Nassau-street, Marylebone, upholsterer, and JOHN CHARLES SCHWIESO, of George-street, St. Pancras, musical instrument maker, both in the county of Middlesex, for improvements in constructing elastic seats or surfaces of furniture.—[Sealed 2nd March, 1841.]

THESE improvements consist in substituting for the laths or webbing, that at present compose the bearing surfaces of chairs, bedsteads, sofas, and other similar articles of furniture, metal bars or laths, formed in parts, connected together by springs, and thus producing an elastic bearing surface.

In Plate XIV., fig. 1, is a cross section of a French bedstead, and fig. 2, a section of a chair, provided with the improved elastic bearing surface; fig. 3, is a plan of the under side of one of the laths, shewing more clearly the mode of connecting the parts together.

The bars or laths are preferred to be made of hoop-iron, and are composed of two or more parts *a, a*, connected together by springs, the outer ends of the laths being bent into the shape of a hook or socket, and attached to rods *b, b*, fastened to the frame of the chair or other article. The mode of connecting the different parts of the laths together is as follows:—

The edges of the parts to be connected are bent into a flange, through which the ends of the spindles *d, d*, are

passed, and secured by pins driven through them. On the other end of each spindle *d*, is a nut and washer *e*, which causes a spiral spring *c*, on the spindle, to press against a washer in contact with the turned-down end of the lath *a*, and thus the bars or laths are pressed closely together; but when any weight is placed on the bearing surface, the springs yield, and the laths are deflected into the position shewn by dots, in fig. 1, and the weight being removed, the laths return to their original position.

The elastic bearing surfaces are covered with cushions, squabs, or mattresses, but when applied to seats or reclining chairs, these articles are stuffed in the same manner as when the bearing surface was made of webbing.

The patentees claim the mode of making elastic surfaces of furniture, by causing each bar or lath to be composed of parts, connected by elastic spring-joints, as herein described.
—[*Inrolled in the Inrolment Office, September, 1841.*]

To JOSEPH CLISILD DANIELL, of Tiverton Mills, near Bath, in the county of Somerset, Gent., for improvements in the manufacture of manure, or a composition to be used on land as a manure.—[Sealed 7th October, 1841.]

THESE improvements consist in various modes of preparing certain substances, in order to render them fit for manuring land, or to make them more beneficial as manure than they would otherwise be.

The substances are divided into three classes, viz.: First class,—Ligneous matter, such as the stems, branches, or roots of trees, shrubs, woody plants, &c.; also peat, straw, weeds, &c. Second class,—Bituminous matter, such as mineral coal, asphaltum, pitch made from coal-tar, vegetable pitch, and vegetable and mineral resin, &c.; likewise tar

or other soft semi-liquid, or liquid bituminous matter. Third class,—Animal matter, such as the substance usually called *graves*, butchers' offal, carrion flesh of any kind, &c. ; and also those kinds of fish which can be easily procured at a sufficiently low rate to be economically used as manure.

The ligneous matters are ground into powder, by any suitable machinery ; or they (as well as the bituminous and other such matters) may be reduced to powder, by exposing them to the action of caustic lime.

The bituminous and resinous matters, if sufficiently brittle, are in like manner ground into a fine powder, by machinery ; but in case they are of an adhesive nature, such as asphaltum, pitch, &c., a small quantity of dry quick-lime, or other earthy matter, is mixed with them, to keep them "free and loose," during the operation of grinding, and prevent them from adhering to the machinery. When the bituminous matters are in a soft, semi-liquid, or liquid state, they are converted, by dry distillation, into vapour, with which ligneous or other suitable matters, such as tanners' spent bark, dyers' spent wood, saw-dust, malt-dust, bean-chaff, ashes, or fine earths, are impregnated, in order to make them fit for use as manure.

The soft bituminous matter may be reduced to a state of minute division, by rendering it partly soluble in water, through the agency of caustic alkali ; and in this mixture the ligneous substances, above mentioned, are steeped.

The animal matters are mixed with pulverized ligneous or bituminous substances, or with the other matters before mentioned, and are then ground into a fine powder.

The mode of using any of the above manures, is depositing them in the ground with the seed, by means of a drilling machine, or scattering them over the ground by what is called broad-casting.—[*Inrolled in the Inrolment Office, April, 1842.*]

To ALEXANDER STIVENS, of Manchester, in the county of Lancaster, engineer, for certain improvements in machinery or apparatus, to be used as an universal chuck, for turning and boring purposes; which said improvements are also applicable to other useful purposes.—[Sealed 19th November, 1840.]

THESE improvements consist, principally, in a novel construction and arrangement of mechanism, constituting an universal chuck, or expanding and contracting apparatus, to be used in lathes, employed for turning and boring purposes.

In Plate XIV., fig. 1, is a view of the back of the chuck, with the outer plate or cover unscrewed or removed, in order to expose the working apparatus. The front plate of the chuck is shewn at *a, a*;—*c, c, c*, are the holding or binding nogs or dies, attached by screws *d, d, d*, to dove-tailed slide pieces *e, e, e*, which slide in the radial mortices *f, f, f*. In one of these slide pieces *e*, a nut is formed, in which a screw *g*, works, having a journal neck or bearing in the front plate *a*, at *h*, so that, as this screw is turned by a key, applied at *i*, the piece *e*, will be slidden to and fro, in its dove-tailed mortice *f*. These pieces *e, e, e*, have each a straight lever or bar *j, j, j*, attached to them, by the pins or screws *k, k, k*; the other ends of these levers being attached, by pins, to an equilateral triangular lever *l, l, l*, which turns loosely on the central boss *m, m*, attached to the front plate; this central boss may be either fixed or moveable, according as the chuck is to be used, either excentric or concentric; or the chuck may be made excentric by merely lengthening or shortening one or two of the arms or levers *j, j*.

Now it will be seen, that by this peculiar arrangement

of leverage, upon turning the screw *g*, the slide-pieces *e, e, e*, with their nogs or dies *c, c, c*, will all be simultaneously slidden to and fro in their mortices, and thus acquire a very powerful binding or holding force. The front plate *a, a*, is also provided with radial mortices or slots *n, n, n*, to secure the work more firmly, and also to allow the chuck to be used as an ordinary face-plate for lathes, should occasion require.

Fig. 2, shews an arrangement of this apparatus, in which the leverage is worked by means of a worm *o*, and wheel *p*, instead of a nut and screw, the worm-wheel also serving for the triangular lever *l*.

The patentee claims the peculiar and novel arrangement and construction of apparatus, constituting an universal chuck, without being confined to the precise numbers, lengths, or dimensions of the leverage *j, j, j*, and *l, l, l*, working upon the central boss *m, m*; which apparatus may also be applied to various other useful purposes and machines. As a brake for cranes, or locomotive engine and carriage wheels, the arrangement to be worked in a similar manner to the chuck; the blocks for holding or binding, to be worked with rods and eyes, instead of fitted slides, as in a chuck, or as an expanding paddle-wheel for propelling steam boats and other vessels; the expanding motion, in this case, having a greater number of levers, equal to the number of floats on the paddle-wheel; or as an expanding pulley, used in machinery for spinning cotton and other materials; or as a contracting motion, for bringing forward any number of dies in a screwing machine, for cutting bolts, &c.; any, or all, or any other application, of which improved expanding and contracting apparatus, he also claims.—[Inrolled in the Petty Bag Office, May, 1841.]

Specification drawn by Messrs. Newton and Son.

To JOHN PETER BOOTH, of Hatton Garden, feather merchant, for certain improvements in the manufacture of a substance or compound fabric, which will be applicable to the making of quilts, coverlets, and wadding, for the purposes of clothing or furniture.—[Sealed 11th November, 1841.]

THIS invention of improvements in the manufacture of quilts, coverlets, and wadding, consists in the application of down thereto, (in the manner hereafter described,) which may be obtained from any bird or animal; but preference is given to that obtained from goose feathers.

After the down has been properly dressed and prepared, in any of the methods usually adopted for such purposes, it is arranged in a layer of convenient thickness, and placed within a case or covering, consisting of two sheets, of any suitable material. When the down is properly placed and arranged in this covering, it is retained in its proper situation, by stitching or quilting the case. After the down is properly secured, the quilt, coverlet, or wadding, thus produced, may be covered with any ornamental fabric, such as satin, silk, velvet, chintz, or other material, according to the purpose to which the improved wadding is intended to be applied.

It will be evident, from the foregoing description, that this invention may be employed for every purpose in which warmth is required; and also, as before mentioned, it may be enclosed within an ornamental covering, of any description, from which it may be removed, with the greatest facility, without at all injuring either the quilt or wadding, or the ornamental case or covering. Another advantage is, that by securing the down or wadding, in an inner case, it is prevented from working through the ornamental covering.

The patentee claims, first, the application of goose-down, under two covers, the inner cover to be quilted or otherwise secured, and the outer or ornamental cover stitched or connected to the inner, in any convenient manner, for the purpose of making quilts, coverlets, or other similar articles of furniture, as above described; and secondly, the application of down, of any description, to be applied in the manner above explained, to every purpose of clothing, where warmth is required, as an improved material for, or mode of, wadding garments.—[*Inrolled in the Rolls Chapel Office, May, 1842.*]

Specification drawn by Messrs. Newton and Son.

To NATHANIEL LLOYD, of Manchester, in the county of Lancaster, pattern designer, and HENRY ROWBOTHAM, of the same place, calico-printer, for their invention of certain improvements in thickening and preparing colours for printing calicoes and other substances.—
[Sealed 26th January, 1841.]

THESE improvements in thickening and preparing colours, for printing calicoes and other substances, consist in the employment of the well-known brown sago of commerce, calcined from the granulated state in which it is usually imported. Sago, reduced to flower, and whitened by the ordinary means, may be also employed for the same purposes; but the plain brown sago, just as imported, calcined at once from the granulated state, is much preferred, both for economy and usefulness.

The calcined brown sago merely requires to be mixed with water, and brought up to two hundred or two hundred and twelve Fahrenheit, when it is fit for use.

The patentees claim the above-described substitution or

use of sago, calcined from the granulated state, or employed in any other form, for the purposes of thickening and preparing colours for printing, in place of the gums now commonly used.—[*Inrolled in the Petty Bag Office, July, 1841.*]

Specification drawn by Messrs. Newton and Son.

To PETER BANCROFT, of Liverpool, in the county of Lancaster, merchant, and JOHN MAC INNES, of the same place, manufacturing chemist, for their invention of an improved method of renovating or restoring animal charcoal, after it has been used in certain processes or manufactures, to which charcoal is now generally applied, and thereby recovering the properties of such, and rendering it again fit for similar uses.—[Sealed 31st March, 1840.]

THIS improvement consists in the application of an alkali, in order to dissolve and carry off the colouring matter and other impurities deposited in animal charcoal, after having been used in decolouring syrups and other fluids, so that the animal charcoal, thus purified and restored, may again be employed in a similar process.

The following is the operation described, with reference to the process of whitening and purifying sugar syrups. The spent animal charcoal being washed, as usual, to remove the last remaining portions of the syrup, which has been operated upon, is to be saturated with a weak solution of caustic potash or soda, the specific gravity of which may be about 1.06, more or less. In this state it is to remain for a few hours, when the colouring matter, and other impurities, in the charcoal, will be dissolved by the alkali.

The caustic alkali being now charged with the colouring

matter, &c., is to be run off by a plug or tap, placed at the bottom of the vessel, or in any other way that may be most convenient, and the charcoal washed with a continuous supply of hot water, until it passes off colourless and free from alkali, which may be ascertained by the use of turmeric powder, or any other known test.

Although caustic potash or soda are named above, as being the best adapted to cleanse the charcoal, carbonates or liquid ammonia will effect the same purpose, though not in so rapid or perfect a manner.

If animal charcoal, in a granular state, is the material to be purified and renovated, the operation of cleansing may take place in the filter or vessel wherein the charcoal is deposited, thereby preventing the trouble and disagreeable consequences of unpacking, care being taken that the vessel is free from any material upon which caustic alkali has a solvent action. But if fine pulverized animal charcoal is to be similarly operated upon, it must be washed by subsidence and decantation.

It will also be evident, that the manner of washing may be readily varied, according to convenience, as all that is really necessary, is a thorough washing or cleansing out of the alkali, along with the colouring matter or other impurity dissolved by it. The alkali, after having been thus employed, may be partially recovered, by evaporation (to dryness) of the dark brown liximum discharged, and ignition of the residuum.

The patentees claim recovering or restoring the properties of animal charcoal, and rendering it fit for use, by the employment of an alkali, to dissolve the colouring matter or other impurities which may have been left or deposited therein, so that they may be readily washed away, by the application of hot water.—[*Inrolled in the Petty Bag Office, September, 1840.*]

Specification drawn by Messrs. Newton and Son.

To ANTHONY TODD THOMSON, of Hinde-street, Manchester-square, in the county of Middlesex, Doctor of Medicine, for an improved method of manufacturing calomel and corrosive sublimate.—[Sealed 8th March, 1841.]

THIS invention consists in combining chlorine, in the state of gas, with the vapour of mercury, in such a manner, and in such proportions, as shall form corrosive sublimate, or bichloride of mercury and calomel.

The process is as follows:—A glass, earthenware, or other suitable vessel, provided with openings at both ends, is mounted in brick-work, or in any other convenient manner, and exposed to the action of an open fire beneath. A certain quantity of mercury or quicksilver is placed in this vessel, and the temperature raised to between 350 and 660 degrees of Fahrenheit, by means of the fire.

One end of the glass or earthenware vessel communicates with an alembic, such as is generally used for generating chlorine gas, and the other end is connected with a large chamber, made perfectly air-tight, to prevent the escape of any of the gases.

In order to produce the chlorine gas, the alembic is charged with a mixture of common salt, binoxide of manganese, and sulphuric acid. The chlorine gas, as it is generated, passes from the alembic through the bent tube into the glass or earthenware vessel, which contains the mercury or quicksilver, where it combines with the vapour of the mercury generated, by raising its temperature to 350 degrees of Fahrenheit, and above.

This combination of the two gases forms either corrosive sublimate or calomel, according to the quantity of chlorine gas employed. The product is found at the bottom of the

air-tight vessel, from whence it may be taken after the operation is completed.

The patentee claims the direct combination of the gas, called chlorine, with the metal called mercury or quick-silver, either in a state of vapour or otherwise, so as to form the compounds called corrosive sublimate and calomel, according to the proportions in which the said vapours or materials are combined.—[*Enrolled in the Petty Bag Office, September, 1841.*]

Specification drawn by Messrs. Newton and Son.

To RICHARD LAWRENCE STURTEVANT, of Church-street, Bethnal-green, soap manufacturer, for certain improvements in the manufacture of soap.—[Sealed 8th March, 1841.]

THIS invention consists in making hard soap, at a single operation, (without separating the lees,) by the use of cocoa-nut oil, palm oil, tallow oil, potash lees, and the muriates of soda and potash; and also in a mode of depriving cocoa-nut oil of its rancid and unpleasant smell.

The white soap, made according to these improvements, is composed of 2072 lbs. of cocoa-nut oil, 168 lbs. of olive or other sweet oil or tallow, 84 lbs. of muriate of soda or potash, 375 gallons of soda lees, of the strength of 24° of Beaume's hydrometer, (which is used at a temperature of 62° Fahr.,) and 60 gallons of potash lees, of the strength of 20°. The cocoa-nut and olive oil are first heated in the soap-pan, and 10 gallons of soda lees being added, the mixture is caused to boil; after which another 10 gallons of soda lees are added, and this addition is repeated at intervals, until the whole of the soda lees have been introduced into the pan, the contents of which are kept at the boiling

point. When this mixture has boiled for half an hour, the potash lees are added to it, in the same manner as the soda lees, and the boiling is continued for about ten minutes. The muriate of soda or potash is now sprinkled slowly over its surface, and after it has boiled for half an hour longer, the fire or steam (by which the soap-pan is heated) is withdrawn, and the soap allowed to cool; it is afterwards finished in the usual way.

In the manufacture of hard soap for fulling, or other purposes, no muriate of soda or potash is employed. The ingredients used are 179½ lbs. of cocoa-nut oil, 336 lbs. of tallow, 224 lbs. of olive oil, 112 lbs. of rape oil or palm oil, deprived of its colour, 400 gallons of soda lees, of the strength of 25°, and 80 gallons of potash lees, of the strength of 20°. The soap thus made, is boiled up with 2240 lbs. of common curd soap, and when cool it is finished in the ordinary way.

Cocoa-nut oil is deprived of its unpleasant smell by boiling it in a wooden vessel, by the aid of steam, with sulphuric and muriatic acids, in the proportions of 6 lbs. of sulphuric, and 12 lbs. of muriatic acid, to every ton of oil; or it may be purified by boiling in an iron pan, through the agency of dry heat.

The patentee claims, Firstly,—The making of hard soap, at a single operation, without separating the lees.

Secondly,—The use of cocoa-nut oil, in conjunction with other materials, in the manner, and for the purposes described.

Thirdly,—The mode of depriving cocoa-nut oil of its rancid and unpleasant odour, by the processes described.

Fourthly,—The use of potash lees, for the purpose of improving the quality and appearance, and giving a greater tenacity to soap.

Fifthly,—The use of muriate of soda or muriate of pot-

ash, for the purposes of giving greater tenacity and hardness to soap.

Sixthly,—The ascertainment, with greater facility and accuracy, of the quantities and proportions of alkaline lees, requisite to be used with the other ingredients in the manufacture of soap.

Seventhly,—The mode of making a fulling soap, or soap for manufacturing purposes, in the manner described.—
[*Inrolled in the Petty Bag Office, September, 1841.*]

To JOHN LAMBERT, of Coventry-street, St. James's, within the Liberty of Westminster, Gent., for certain improvements in the manufacture of soap,—being a communication.—[Sealed 15th July, 1840.]

THIS invention consists in the production of a paste, which is to be mixed with soap, for the purpose of enabling it to be sold cheaper.

The paste is composed of bones, which are broken into small pieces, and allowed to remain for two or three weeks in caustic alkaline lees, until they are reduced to the consistence of kitchen-stuff; this paste is then passed between three pairs of weighted rollers, and after being heated by steam, is stirred into the soap, when it is fit for framing; the proportion of paste, mixed with the soap, depends upon the required quality of the latter.

To improve the quality of the paste, 10 lbs. of tallow, and 10 lbs. of caustic alkaline lees, are added to each 100 lbs. of paste.—[*Inrolled in the Petty Bag Office, January, 1841.*]

DESCRIPTIONS OF PATENTS GRANTED IN 1834, WHICH
HAVE NOT BEEN REPORTED IN THIS JOURNAL.

(Continued from page 292, Vol. XX.)

To THOMAS RIDGWAY BRIDSON, of the Township of Great Bolton, in the parish of Bolton-le-Moors, in the county of Lancaster, bleacher, for certain improvements in machinery or apparatus to be used in the operation of drying cotton, linen, and other similar manufactured goods.—[Sealed 10th June, 1834]

THIS invention consists in improved machinery (similar, in many respects, to Mr. William Southworth's patent stove machinery*,) for hanging or suspending damp or wet calicoes, &c., on a series of rails, in a stove or drying-house, in order to dry the same; which machinery also removes the calicoes, &c., from the rails, after they have been dried.

The drying-house is similar to that used with Mr. Southworth's machinery, the drying rails being arranged near the upper part of it, in a horizontal row, at equal distances from each other. A carriage, containing the machinery, and mounted on four wheels, travels on guides, from one end of the drying-house to the other, being moved forwards, at intervals, through a space equal to the distance between the centre of one drying-rail and the centre of the next, by the attendant turning a handle, and thereby communicating motion, through a set of toothed wheels, to a large toothed wheel, on each of the hind wheels of the carriage.

The foremost end of the carriage carries three rollers, on which the wet cloth is wound; and in the centre of the carriage a large drum is mounted, the cloths passing over it, as they are lowered down to, or raised up from, the drying rails. On the hind end of the carriage is the gearing, (actuated by manual labour,) by which motion is communicated to the different parts of the machinery; and at each side of this end of the carriage is the apparatus, by which the length of each fold of the cloth, between the drying-rails, is regulated;—it is shewn partly in section in Plate XV., and consists of a hanging carrier *a*, suspended from a vertical stud *b*, on which it is capable of swivelling or turning. On the top of the carrier is a horizontal bevil toothed wheel *c*, taking into a bevil pinion *d*, on the shaft *e*; by causing which shaft to revolve, the requisite swivelling motions are communicated to the carrier. In each of these carriers a double-grooved pulley *f*, is mounted, the diameter of which, added to one thickness of the rope that passes round it, is equal to the distance between the centres of the drying-rails; and motion is communicated to the

* For Specification of this Patent, see the London Journal of Arts and Sciences, Vol. 8, First Series, p. 298.

pulley *f*, by the spur-pinion *g*, taking into the spur-pinion *k*, or *i*, on the end of the spindle *j*, of the pulley. When the carrier swivels on its stud, the pinion *g*, is raised out of the teeth of the pinion which it is driving, in order that the latter may follow the movement of the carrier, and be replaced by the pinion on the opposite end of the spindle *j*; and when that change has been effected, the pinion *g*, is again lowered.

k, and *l*, are two ascending and descending revolving rollers, the axes of which turn in bearings in the lower ends of four rods *m*, connected to the horizontal fixed staves *n*, and *o*; these staves have a small pulley *q*, carried by a swivel *p*, round which pulley and round the pulley *f*, the endless rope *r*, passes.

The mode of operating with this machine is as follows:—The calicoes, &c., having been wound, in a wet state, on the three rollers before mentioned, their ends are carried over the large drum; and after passing underneath that revolving roller, which is at its highest position a little above the drying-rails, (the other roller being at its lowest position, which is the depth that the fold of the cloth is to descend to,) are fastened to the first drying-rail by hooks. The cloth being thus fastened, the attendant communicates a revolving motion to the large drum, thereby drawing the wet cloths off the rollers, and delivering them on to the drying-rails.

As the cloths descend between the first and second drying-rails, the upper revolving-roller descends also, by reason of the revolution of the pulleys *f*; and as its descent is slightly quicker than that of the cloth, it exerts a gentle pressure on the bottom of the loop of cloth. When the loop of cloth has attained the desired length, the roller, just mentioned, resting at the bottom of it, the other roller will be in its highest position, a little above the drying-rails; the machine is then advanced a distance equal to the space between two of these rails, and motion being, at the same time, communicated to the shaft *e*, the hanging-carriers, with their appendages, are caused to swivel on their vertical studs half a revolution, whereby, and by the progression of the carriage, the upper revolving-roller is moved from its position, over the space in advance of the first drying-rail, to a position above the space between the second and third rails; the above operation is then repeated, until the whole of the cloths are hung on the drying-rails.

In order to take up the cloths when they are dry, the three rollers, on which they are to be wound, are placed in contact with the large drum, (being at the same time capable of receding from it as they increase in diameter,) and the ends of the cloths are attached to them. The drum is now turned in the contrary direction to that in which it was turned when delivering the wet cloth, and the three rollers, receiving motion from it, wind up the cloth. The pinion *g*, is kept raised during the operation of

winding up the dried cloth, so that the revolving rollers and fixed staves are caused to ascend and descend, merely by the taking up of the cloth, (the hanging carriers swivelling, every time that either roller reaches its highest position,) and by their weight, resting at the bottom of the ascending loops, that tension is given to the cloth which is requisite in the operation of taking-up.—[Enrolled in the Enrolment Office, December, 1834.]

To JOHN BARTON, of Providence-row, Finsbury, engineer, and SAMUEL NYE and JOSEPH NYE, both of St. Andrew's road, Southwark, in the county of Surrey, mechanics, for improvements in the construction and application of pumps, and machinery for raising fluids, and other purposes.—[Sealed 1st July, 1834.]

THE first improvement consists in placing four valves inside a single-barrelled pump, in order to render the same double-acting.

In Plate XV., is shewn a transverse vertical section of a single-barrelled pump, constructed according to these improvements. *a*, is the ordinary barrel of the pump, divided into two parts *b*, and *c*, by the partition *d*, in which the inductive valve *e*, to the upper part, is mounted. *f*, is the suction pipe; *g*, the eduction pipe; and *h*, the piston. The lower part *c*, of the barrel, contains the box or chamber *i*, (provided with the inductive valve *j*, and eduction valve *k*,) which communicates with the upper part of the barrel by the trunk or channel *l*, and with the eduction pipe *g*, by the pipe *m*. *n*, is the eduction valve to the upper part of the barrel, opening into the eduction pipe *g*.

The action of this pump is as follows, the piston being in its highest position at the commencement of the pumping:—

The descent of the piston causes the water, as it enters the part *c*, of the barrel, through the pipe *f*, to pass through the valve *j*, into the chamber *i*, and rise up the trunk *l*; and by its ascent, the water within the trunk *l*, and lower part of the chamber *i*, is forced through the valve *k*, and pipe *m*, into the eduction pipe *g*. By this movement, also, the water, which rushes into the lower part *c*, of the barrel, through the pipe *f*, in one continued stream, is caused to pass through the valve *e*, into the upper part of the barrel, from whence it is forced through the valve *n*, into the eduction pipe, by the descent of the piston; thus, a continuous stream of water will flow from the eduction pipe of the pump.

The second improvement is applied to a single acting pump, or a syringe for a stomach pump, and consists in placing the eduction valve in the branch or eduction pipe, instead of inside the pump barrel.

The third improvement relates to the apparatus for administering injections, &c., and for other purposes, and consists in placing the syringe or pump within the vessel containing the fluid to be administered, so that the space required for the whole instrument, will be only that which is occupied by the outer vessel itself.

The fourth improvement consists in constructing the eduction tubes of syringes or stomach pumps, with universal joints, by which means metallic tubes may be used, and still offer sufficient movement to adapt them to the different positions required.

The fifth improvement relates to a mode of lubricating the bearings of machinery, by means of a small vessel partly filled with oil, in the bottom of which an upright tube is inserted, its upper end standing above the level of the oil, and the oil is supplied to the bearings by a series of woollen threads, which ascend from the oil to the top of the tube, and then descend through the tube to the bearings. The improvement consists in attaching the upper ends of the threads to a float, from which a short tube rises, enclosing the tube before-mentioned; and as the threads must pass over the upper edge of the short tube, before they can descend the other tube, the shorter leg of the syphon formed by the threads, will always be the same length.—[*Inrolled in the Inrolment Office, January, 1835.*]

To WILLIAM HIGGINS, of Manchester, in the county of Lancaster, machine maker, for certain improvements in machinery used for making twisted rovings and yarns of cotton, flax, silk, wool, and other fibrous substances,—communicated by a certain foreigner, residing abroad.—[Sealed July 7th, 1834.]

THE first part of this invention consists in an improved spindle and flyer, by which the requisite differential or taking-up motion for winding on the yarn can be communicated to the bobbins or tubes, in roving and spinning machines, where the bobbins revolve on the axes of the twisting spindles, thereby rendering unnecessary the mechanism usually employed for that purpose.

A drawing of the improved spindle and flyer is shewn in Plate XV. *a*, is the spindle, turning at its lower end in a step, and at its upper end in the swivel bush *b*, carried by the forks *c*, attached to the front roller; *d*, is the bobbin or tube; and *e*, a pulley, fixed on the spindle *a*, round which a revolving endless band passes to communicate motion to the spindle. Through the pulley *e*, two mortices are cut to allow the perpendicular arms *f*, and *g*, to pass; the arm *f*, is hinged to the under side of the pulley *e*, and is formed at its lower end of lance wood, its upper end being made of metal, so as slightly to overbalance the lower end, (which winds the yarn on the bobbin,) and keep it in

contact with the bobbin *d*. The arm *g*, is a steel spindle, having at its lower end, a small fluted wooden cylinder *h*, and at its upper end, a toothed wheel *i*, which takes into a pinion *j*, formed on the lower end of the swivel bush *b*. This spindle passes through and revolves in a socket *k*, hinged to the upper side of the pulley *e*,—and the lower part of the socket being attached by a spiral spring *l*, to the spindle *a*, the cylinder *h*, will be always kept in contact with the bobbin. By this means, the arm *g*, will not only accompany the spindle *a*, in its revolution, but by reason of its wheel *i*, taking into the stationary pinion *j*, will also revolve round its own centre, and by means of the cylinder *h*, pressing on the bobbins, the requisite differential motion will be obtained. It should be observed, that the arms *f*, *g*, cannot move laterally in the mortices, in the pulley *e*, but only to and from the spindle; and as the arm *g*, with its appendages, is much heavier than the arm *f*, a counterpoise weight *m*, is attached to the under part of the pulley, on the opposite side.

The upper part of the spindle *a*, is hollow, and two holes are bored in it, one at the top, and the other directly beneath the pulley *e*, so as to allow the yarn to pass through it, on its way to the bobbin, the upper hole being countersunk, and cut round the inside into shallow grooves.

When operating with this spindle and flyer, the yarn is first passed through the upper part of the spindle, and led down to the lower end of the arm *f*, round which it is wound in a spiral direction, (the arm being cut with a spiral groove for that purpose,) and then wound two or three times round the bobbin *d*, to secure the end; a revolving motion is then communicated to the spindle *a*, and the yarn is twisted and wound round the bobbin in the usual manner.

The second part of the invention consists in the construction of an apparatus for effecting the necessary shortening of the coping motion, by which the rovings or threads are wound in the form of a cylinder, with conical ends, on the bobbins.

To the coping rail a small carriage is firmly fixed, and in it a horizontal screw turns freely, carrying a nut, and having on the end of it a ratchet wheel, which is turned round one tooth by a stationary click, every time the coping rail ascends, so as to move the nut gradually along the screw, away from the ratchet wheel. Through the nut the end of a lever passes, connected with the gearing that traverses the coping rail, and as this lever moves along the screw, with the nut, it gradually decreases the traverse of the coping rail, which decrease produces the conical ends of the rovings.—[*Inrolled in the Inrolment Office, January, 1835.*]

To JOHN GOLD, of Birmingham, in the county of Warwick, glass-cutter, for improvements in cutting, grinding, smoothing, polishing, or otherwise preparing, glass decanters, and certain other articles.—[Sealed 7th July, 1834.]

THIS invention relates chiefly to the manner of holding decanters and other articles, whilst they are ground and polished.

The first improvement is shewn in Plate XV., at figs. 1, 2, and 3. Fig. 1, is a plan, and fig. 2, a side view, partly in section, of the framing of one of the holders, capable of containing six decanters, a decanter being shewn, in one of the compartments, in order to illustrate the mode of securing the same; and fig. 3, is a front view of the decanter, and part of the framing.

The grinding, smoothing, &c., is effected by a large circular plate or disc *a*, mounted on the upper end of a vertical shaft; above which plate, near its periphery, and at equal distances apart, three holders, similar to that shewn in the plan, fig. 1, are suspended, by means of their shafts *b*. The holders each consist of a framing *c*, with recesses *d, d, d*, for receiving six decanters, which are secured in the same by means of a frame or cradle *e*, bolted to the framing *c*, and the collar *f*, the decanter being prevented from shifting, by the three wedges *g, g, g*. When the decanters are secured in their proper places, a revolving motion is communicated to the plate *a*, and the holders are caused to revolve also, but in the opposite direction, so as to wear the outer portion of the plate equally all round.

The second improvement consists in fastening the decanters in lever holders, actuated by an excentric or other mechanical movement, so as to cause the decanters or other vessels to reciprocate on the grinding or smoothing surface, (which is, in this instance, a bevelled edge or rim, raised round the upper side of the plate *a*,) and thus tend to keep its face even.

The third improvement consists in an arrangement of apparatus for removing all the decanters that are being operated on at the same time, simultaneously, from the vertical grinding or smoothing plate, and for bringing them in contact with the same simultaneously.

Fig. 4, is a side view of the apparatus, both sides being alike. *h, h, h*, are seven worm-shafts, connected together at their inner ends, by the bevil pinions *i, i, i*; the outer end of each shaft carries a nut, fastened to the plate *j*, through openings in which plate, the ends *k*, of the decanter-holder, pass, so that the revolution of the worm-shafts will cause the decanters to approach or recede from the grinding-plate or surface *l*. A rotary motion is communicated to the shafts *h*, through the pinions *i*, by turning the handle *m*, at each side of the machine, and thus the positions of the decanters, with respect to the grinding surface, may be regulated with the greatest nicety.

The fourth improvement consists in securing the holders, containing the decanters, on a sliding frame, which works on guides, so as to cause the decanters or other vessels to assume any position required, with reference to the grinding or smoothing surface.—[Inrolled in the Inrolment Office, January, 1835.]

To PIERRE BARTHELEMY GUINIBERT DEBAC, of Acre-lane, Brixton, in the county of Surrey, professor of languages and mathematics, at the Polytechnic School, Paris, for an improved machine for weighing, with the means of keeping a register of the operations of the instrument.—[Sealed 26th July, 1834.]

THE weighing machine is shewn in Plate XV., at fig. 1. It consists of a vertical beam *a*, turning, at its centre, on an axis *b*, and having, at each end, an arc *c*, the lower end being also loaded with a constant weight *d*.—*e*, is a horizontal lever, the front end of which is formed into a segment, and is connected by a small chain, in the manner shewn in the drawing, with the disc *f*, from which the arms of the beam *a*, project. The lever *e*, turns on a centre *g*, and carries the link *h*, the lower end of which is forked, and provided with a bolt or screw *i*, for the purpose of suspending the scale or platform, containing the article to be weighed.

The upper end of the link is formed into a loop, provided with a knife-edge, which rests in a notch in the upper edge of the lever *e*, the weight of the link and platform being counter-balanced by the weight *j*, on the tail-end of the lever *e*.

From the framing *k*, a flat bar *l*, descends, terminating at its lower end in a graduated arc *m*, called the regulating arc, being used for the purpose of regulating the machine; and to the front of the framing another bar *n*, is attached, supporting, at its upper end, the dial *o*, upon which the weight of the article is indicated, the fractional parts, and smaller weights, being marked round the outer part of the dial, and the larger weights along a slot in the face of the dial. The smaller weights are pointed out by the hand *p*, mounted on a spindle, carried by a small cylinder *q*, shewn by dots in the figure; round this cylinder a cord or chain passes, its ends being secured by the screws, at the under side of the upper arc *c*, so that the movement of that end of the beam *a*, caused by the weight of the article suspended from the horizontal lever *e*, will turn the cylinder, and with it the hand *p*. The large weights, or rather the number of revolutions of the cylinder *q*, are shewn by a hand attached to the upper arc, which projects through the slot in the dial.

Fig. 2, is a side view of the apparatus, by which the weight of the different articles weighed by the machine, during a certain

length of time, are registered. When it is used with the weighing machine, the dial *o*, may be removed, and the registering apparatus provided with a dial.

r, is a cylindrical framing, having its axis *s*, connected by a cord (in a similar manner to the cylinder *q*), with one of the arcs of the vertical beam *a*, so as to partake of its movements; and upon the end of the axis *s*, if the registering apparatus is provided with a dial, the hand *p*, is mounted. The paper on which the weights are to be registered, is wound on a roller *t*, and proceeds from thence over a roller *u*, covered with India-rubber, to the roller *v*, to which the end of the paper is fastened; and the rollers *t*, *v*, are turned a little by weights, every time an article is weighed by the machine, so as to bring a fresh portion of the paper to the upper part of the roller *u*, to have the weight of the article marked upon it, by the points of the levers *w*. These levers are mounted upon a long horizontal axis *x*, and are acted on by a spiral rod, extending from one end of the framing *r*, to the other, which revolves with it, and depresses the levers *w*, as different portions of its length come in contact with them, causing them to perforate the paper; the perforations shewing the weight of the article. The tail ends of the levers *w*, are sufficiently heavy to elevate the points out of the paper, when the spiral rod will permit them to do so, in order that a fresh portion of the paper may be brought beneath them.

The patentee claims, first,—the vertical beam, moveable on a centre in one plane, and loaded with one constant weight, which is acted upon by the weight of the body to be weighed, through the medium of a lever, supported near the fulcrum of the vertical beam, as described; the extent of the angular motion of which beam marks the weight of the said body, and causes the registering apparatus to act, by the sole agency or pressure on the machine of the body to be weighed; and secondly,—the registering apparatus.—[*Inrolled in the Inrolment Office, January, 1835.*]

To WILLIAM HALE, of Colchester, in the county of Essex, civil engineer, for certain improvements in or on windmills, which improvements are applicable to other purposes.—[Sealed 26th July, 1834.]

THIS invention relates to windmills, so constructed, that they move in a horizontal circuit, and is also applicable to tide-mills, the sails or vanes being, in that case, made of wood, or any other suitable substance, instead of sail-cloth. It consists, firstly, in supporting the shafts, which each carry two sails, midway, or at the centre of resistance, whereby the wind or water, pressing respectively on the two sails, will exert an equal degree of force

on each end of the shaft; and secondly, in supporting such windmill on a fixed or stationary post.

In Plate XV., fig. 1, is an elevation, and fig. 2, a plan of this arrangement. *a, a*, are the shafts, which each carry two sails or vanes, and are supported at either centres by bearings in the ends of the beams *b, b*; these beams are strengthened by the braces *c, c*, and *d, d*, together constituting a frame, which is mounted on a stationary post *e*, and revolves round the same, having at the lower part of it a cog-wheel *f*, by which the motion of the frame can be communicated to the mill-stones, or any other machinery required to be driven. Upon the upper end of the post *e*, is a bevil toothed wheel *g*, which is kept stationary whilst the mill is at work, but can be turned if the wind changes, in order that the sails may always travel in the same direction. Into this wheel four pinions *h, h*, keyed on the ends of the shafts *i, i*, gear; the other ends of the shafts carrying four smaller pinions *j, j*, take into the bevilled toothed wheels *k, k*, on the shafts *a, a*; so that by this arrangement, the sails will be moved half round on their own axes, whilst the frame describes one revolution, and will consequently present their edges to the wind when they are travelling against it, as shewn in fig. 2; the wind is supposed to be proceeding in the direction of the arrows, and it will be seen, that the pairs of sails 1, 2, and 3, which are travelling in the same direction as the wind, will present their sides to it; but the pair of sails 4, which are proceeding in an opposite direction to the wind, present their edges to it, and so offer no resistance.

The patentee claims, first, supporting the shafts or axes *a, a*, midway, or at the centre of resistance of the sails or vanes, as described, whereby the pressure will be equal on each end of the shaft.

Secondly,—placing such description of mill on a fixed stationary post *e*, as described.—[*Inrolled in the Inrolment Office, January, 1835.*]

To EDMUND YOULDON, of Exmouth, schoolmaster, for improvements in preventing or curing what are termed smoky chimneys.
—[Sealed 5th August, 1834.]

THIS desirable object is effected in the following manner :—On the top of the chimney a cylindrical cover or casing of zinc is fixed, and round the upper part of it eight longitudinal openings are formed, for the passage of air and smoke, being shielded from the wind, in one direction, by curved plates or wind guards. Within the upper part of the casing, are four large curved vanes, affixed to a vertical shaft, which turns, at its lower end, in a bearing carried by a cross framing, and at its

upper end, in a bearing in the top of the casing, having, near the lower end of it, a toothed wheel, taking into a pinion on the upper end of a short vertical shaft. This shaft carries a fan-wheel, of a similar construction to those used in smoke-jacks, and, as the wheel is not quite so large in diameter as the interior of the casing, the remaining space is occupied by a ledge or shelf, so that the smoke will have no means of escape, excepting between the leaves of the fan-wheel.

The action of the apparatus is as follows:—The wind, in whatever direction it may lay, will enter the casing through three of the openings only, and pass out through the others, carrying with it the smoke; but, at the same time, acting on the curved vanes, will cause them to rotate, and by means of the toothed wheel and pinion, above mentioned, communicate a revolving motion to the fan-wheel. The revolution of this wheel, creates a partial exhaustion in the chimney, and consequently, accelerates the ascent of the smoke, which, passing through the fan-wheel, escapes through the openings in the case.

The patentee claims combining the action of the vanes with the fan-wheel, whereby the wind, in giving motion to the vanes, causes the fan-wheel to create an exhaustion below it, and a consequent draft up the chimney, and thus, prevent or cure what are termed smoky chimneys.—[*Inrolled in the Inrolment Office, October, 1834.*]

To JAMES PEDDER, of New Radford, in the county of Nottingham, machinist, for certain improvements, applicable to certain machinery for making bobbin net lace, for the purpose of making ornamented bobbin net lace, by the application to such machinery of any or all of the said improvements.—[Sealed 15th August, 1834.]

THESE improvements consist, firstly, in a mode of transmitting the action of the racking wheels to the pusher bars, or other bars of machinery for making ornamental bobbin net lace, that may require occasional extra racking motions to be given to them, by the aid of additional fancy racking wheels, (which are turned round with a much slower motion than the ordinary racking wheels,) in order to produce such variations, in the ordinary racking motions, as may be requisite for the formation of ornamental patterns in the lace. Secondly, in the application to pusher machinery, of certain long thread guides, which pass downwards between the combs, for the purpose of introducing thick threads, called gimp threads, and bringing the same within reach of the taking-down points, which form the meshes, in order that those threads may be woven into the ornamented lace made by

the machinery. Thirdly,—in a mode of making small opaque spots in the lace, by causing some of the bobbin threads to twist round two adjacent warp threads, and by omitting a crossing of bobbin threads between those two warp threads, at every place where a spot is to be formed, by such unusual twisting of the bobbin threads round the two warp threads. Fourthly,—in the formation of a slight ornamental thread work, distributed in small detached patches in the lace, by occasionally deflecting certain of the warp threads laterally, so as to form vacancies amongst them, and thereby prevent the formation of twisted pillars within such patches, in order that only the crossings of diagonal threads may appear. Fifthly,—in producing slight filling-up thread work, somewhat similar in appearance to that just mentioned, but obtained by different means; the warp threads which belong to those parts of the net where patches of filling-up thread work are intended to be made, not being removed from the twisting of the bobbin threads, as above explained; but the twisting is prevented, by modifying the racking motions of the selected warp threads, by means of extra guides, so as to cause the bobbin threads to pass and re-pass, between those warp threads, always on the same side, whilst the other bobbin threads are going round their corresponding warp threads, in order to form twists therewith, as usual.

In Plate XV., fig. 1, represents the mode by which the fancy racking wheels are made to act in concert with the ordinary racking wheels, for the purpose of producing occasional variations in the ordinary racking motions, according to the first improvement. The ordinary racking wheel *a*, operates upon a horizontal sliding bolt *b*, which has a spur projecting downwards from it, bearing against the lower end of an intermediate lever *c*, jointed to the racking bolt *d*; the upper end of the lever *c*, bears against the end of a gauge screw *e*, at the lower end of a pendulous lever, which is actuated by the notches of the fancy wheel *f*. Thus, the fancy racking wheel, and the ordinary racking wheel, are so connected with the guide bar to which they belong, as always to concur with each other in giving racking motions thereto, and in such manner, that, although the ordinary racking wheel will always communicate to that bar all the racking motions requisite for making plain net, yet, the fancy racking wheel will, nevertheless, operate on the same bar, whenever it is requisite to prolong or diminish the extent of such racking motions, for the purpose of producing ornamental work in the net. But the ordinary racking wheel retains its control over the bar, after the fancy racking wheel has acted upon it, as completely as it did before the same took place,—the lever *c*, *c*, moving backwards and forwards with the guide bar bolt *d*, and consequently, remaining, at all times, in contact with the bolt *b*, and set screw *e*.

Fig. 2, is a partial transverse vertical section of a pusher lace machine, with the remainder of these improvements applied thereto. *g*, is the guide bar for the gimp threads, the interweaving of which, into the net, constitutes the second improvement; and *h*, are the long guides, screwed thereto, at such places as the pattern requires. The blades of these guides are very thin, in order that the carriages may pass and repass, without interfering with the thick gimp thread, which is conducted through holes in the guide, so as to pass down partly on one side, and partly on the other, until it gets down to the eye at the lower extremity; and grooves are cut in the substance of the guide, to allow the gimp thread to lay as flat as possible therein. The lower ends of the guides *h*, descend within reach of the taking down points *t*, and *u*, when they are raised for insertion among the threads, and are situated in front of the front guide threads, in the space between them and the front combs, so as to have liberty to move laterally in that space, when the guide bar *g*, is moved endways. The guide bar *g*, is racked, when required, by an ordinary racking wheel, and a fancy racking wheel, acting together, as described in the first improvement.

The gimp threads are supplied from a roller *i*, which is turned round at intervals, in order to give off the threads in the quantities required for inlaying into the net, by power derived from the movement of the guide bar *g*. This is done by means of a pair of serrated tooth racks *j, j*, (seen in the detached plan view, fig. 3,) jointed to the left hand end of the guide bar *g*, and operating upon a ratchet wheel *k*, fixed on the lower end of an upright axis *l*, the racks *j, j*, being kept in contact with the wheel *k*, by means of the spring *w*. On the upper end of the shaft *l*, is a bevil wheel working into another bevil wheel, on the end of the axis of the roller *i*. By this arrangement, whenever the guide bar *g*, moves in either direction, one of the racks *j, j*, will turn the wheel *k*, round, and that motion will be transmitted by the bevil wheels, above mentioned, to the roller *i*; and owing to the serrated form of the teeth of the racks *j, j*, and wheel *k*, the racks will turn on their centre, affixed to the guide bar, in one direction, and slip over the teeth of the wheel *k*, so as to turn the gimp roller always the same way round.

Behind the main guide bars is an extra guide bar *m*, called the spotting bar, (being used for forming spots in the net, according to the third improvement,) with guides *n*, projecting forwards from it, between the guide bars, having stump guides at their ends, one at every place where spots are required to be made in the net; these guides are inserted between the front guide threads, the same as selvaige guides, and, in like manner, bend them aside, when required. The spotting bar *m*, is racked by a fancy racking wheel, turned by a ratchet wheel of forty-eight

teeth, which is driven round half a tooth at a time, by a driver and lifting lever.

The extra guide bar for producing patches of slight filling-up thread work in the net, according to the fourth improvement, is shewn at *o*; its guides *p*, proceed over the front guide bar *v*, and have two eyes, to receive the two threads which belong to the row of front guide threads; so that by racking the extra guide bar *o*, those threads can be deflected out of their proper places, for the purposes hereinbefore explained. The extra guide bar *o*, is racked by an ordinary racking wheel, exactly like the front guide bar racking wheel, and by a fancy racking wheel, fixed upon the same axis as the fancy racking wheel for the gimp guide-bar *g*; and the racking motions take place at the same time as those of that bar.

q, is one of the extra guide bars used for producing patches of slight filling-up thread work in the net, by the mode which constitutes the fifth improvement; its guides *r*, extending forwards to the row of back guide threads, with stump guides inserted between the threads. The other extra guide bar is not represented in fig. 2, but it resembles the selvage guide bar *s*, having guides reaching from it between the main guide bars, with stump guides inserted between the front guide threads. These extra guide bars are each racked by an ordinary racking wheel, and a fancy racking wheel, the latter being fixed on the same axis as the fancy racking wheel for racking the gimp guide bar. The steps in the ordinary racking wheel, are adapted to give such racking motions to the extra guide bar *q*, as would prevent any twists being formed round the warp threads upon which its guides operate; but the steps in the fancy wheel are adapted to modify these movements, when required, so as to cause them to coincide with those of the front guide bars.

The patentee claims, Firstly, the mode above described, of transmitting the occasional action of fancy racking wheels, and the continual action of ordinary racking wheels, so that both actions will concur in giving racking movements to the bars of bobbin net lace machinery, for the purpose of making ornamented bobbin net lace.

Secondly,—The mode, herein described, of interweaving gimp threads into the ornamented bobbin net lace, made by pusher machinery.

Thirdly,—The mode, herein described, of producing ornamental spots in the bobbin net lace, made by pusher machinery.

Fourthly,—The mode, described under the fourth improvement, of producing ornamental patches of slight filling-up thread work in bobbin net lace, made by the ordinary machinery, in which the bobbin carriages traverse.

Fifthly,—The mode, described under the fifth improvement, of producing ornamental patches in bobbin net lace, similar to

those before mentioned, made by any ordinary machinery, in which the bobbin carriages traverse.—[Inrolled in the Rolls Chapel Office, February, 1835.]

To JOHN RAPSON, of Penryn, in the county of Cornwall, engineer, for improved apparatus for facilitating the steering of vessels of certain descriptions.—[Sealed 23rd August, 1834.]

THIS invention is applied to those vessels which are steered by means of steering-wheels, and consists, firstly, in fixing upon the shaft or axis of the steering-wheel an endless screw, working into a pinion, on the shaft of the pulley or drum, round which the tiller-ropes pass; or, instead of an endless screw, a wheel, with diagonal cogs, taking into a similar wheel on the shaft of the pulley, is used.

The second part of this invention consists in fixing the steering-wheel on the extremity of a long endless screw, which has, at its other end, a pinion, taking into a pinion on the end of another endless screw, parallel to, and of the same size and length as the first. Upon each screw is a burr or traversing nut, connected by rods to two tiller-arms, fixed on the square of the rudder-head; and from this arrangement, it will be evident, that if the steering-wheel is turned, both screws will revolve, causing the traversing nuts to move in contrary directions, and through the agency of the rods and tiller-arms, the rudder will assume the position required.

The patentee claims the application of the endless screws, and wheels with diagonal cogs, in manner aforesaid, for the purpose of facilitating the steering of vessels of such descriptions as require steering-wheels.—[Inrolled in the Inrolment Office, December, 1834.]

To JOHN BEARD, of the parish of Leonard Stanley, in the county of Gloucester, for certain improvements in machinery for dressing woollen cloth.—[Sealed 1st September, 1834.]

THIS invention is applied to the machinery for dressing cloth, called gig-mills, in which a pile is produced on the cloth, by means of teazles, (or a substitute for the same,) fixed round the circumference of a cylindrical revolving barrel, under which the cloth passes slowly, the bent points of the teazles acting in the direction of the length of the cloth,

The first improvement consists in the use of two pair of revolving gig-barrels, placed obliquely across the cloth, one barrel

of each pair reaching obliquely over one-half of the width of the cloth, in one direction, and the other barrel, of the same pair, reaching over the other half of the width, in the contrary direction, so that the teazles (or the substitutes for them) will act obliquely outwards, from the middle of the cloth towards its edges, and the teazles of one pair of gig-barrels will act transversely across, or nearly at right angles, to the oblique directions in which the teazles of the other pair of barrels act on the cloth.

The second improvement consists in applying to the two pairs of gig-barrels, above mentioned, supporting beds or surfaces, over which the cloth passes, for the purpose of keeping the cloth up firmly to the action of the teazles. The supporting beds are capable of sliding endways, in order to adjust them to the width of the cloth, and, by means of set-screws at their ends, can be made to give a greater pressure at the edges of the cloth than at the middle, if required, or every part of the cloth may be equally acted upon by the teazles.—[*Inrolled in the Inrolment Office, February, 1835.*]

To GEORGE JOSEPH GREEN, JOHN OGDIN BACCHUS, and WILLIAM GAMMON, of Birmingham, in the county of Warwick, glass manufacturers, for improvements in the manufacture and working of plate and other glass,—communicated by a certain foreigner, residing abroad.—[Sealed 1st September, 1834.]

THIS invention is intended to obviate the inconvenience that always occurs in working the melted glass from the pots, owing to a quantity of scum or impurities rising to the surface of the metal, which must be skimmed or raked out of the pots; but this operation not only removes the scum, but also some of the pure glass; and in working the metal from the pots so skimmed, great care must be taken, or else a portion of the scum, which is constantly rising, will be taken out with the melted glass.

The improvements consist, in placing on the surface of the metal, a ring, made of the same clay as the pots, and dried and burnt in the same manner, having two or three arms projecting from its outer edge, in order to keep it in the centre of the pot. This ring prevents the scum, which is constantly rising at the sides of the pot, from flowing inwards towards the centre; so that if the surface of the metal within the ring is once cleared of the scum, it will remain so, and thus the metal may be worked from within the ring, without any danger of its being mixed with the scum.

The patentees claim, the improvements in the manufacture of glass, by working the metal from a clear surface, kept by means of rings, floating on the surface thereof, as described.—[*Inrolled in the Inrolment Office, February, 1835.*]

Original Paper.

SUPPLEMENT TO A REPORT UPON THE APPARATUS FOR HEATING
AND VENTILATING THE APARTMENTS OF THE REFORM CLUB
HOUSE.*—BY ANDREW URE, M.D., F.R.S.

The cheering and bracing action of condensed air, and the opposite effects of rarefied air, upon human beings, formed the subject of several fine physiological experiments, made a few years ago by M. Junot, and described by him in the 9th volume of the *Archives Generales de Medecine*:—"When a person is placed," says he, "in condensed air, he breathes with a new facility; he feels as if the capacity of his lungs was enlarged; his respirations become deeper and less frequent; he experiences, in the course of a short time, an agreeable glow in his chest, as if the pulmonary cells were becoming dilated with an elastic spirit, while the whole frame receives, at each inspiration, fresh vital impulsion. The functions of the brain get excited, the imagination becomes vivid, and the ideas flow with a delightful facility; digestion is rendered more active, as after gentle exercise in the air, because the secretory organs participate immediately in the increased energy of the arterial system, and there is therefore no thirst."

In rarefied air the effects on the living functions are just the reverse.—The breathing is difficult, feeble, frequent, and terminates in an asthmatic paroxysm; the pulse is quick and most compressible; hæmorrhages often occur, with a tendency to fainting; the secretions are scanty or totally suppressed, and at length apathy supervenes.

These striking results obtained on one individual at a time, with a small experimental apparatus, have been recently reproduced, on a working scale, with many persons at once enclosed in a mining shaft, encased with strong tubing, formed of a series

* For former Report, see p. 140, of the present Volume.

of large sheet-iron cylinders, rivetted together, and sunk to a great depth through the bed of the river Loire, near Languin. The seams of coal, in this district of France, lie under a stratum of quicksand, from 18 to 20 metres thick, (20 to 22 yards,) and they had been found to be inaccessible by all the ordinary modes of mining previously practised. The obstacle had been regarded to be so perfectly insurmountable, that every portion of the great coal basin, that extends under these alluvial deposits, though well known for centuries, had remained untouched. To endeavour, by the usual workings, to penetrate through these semi-fluid quicksands, which communicate with the waters of the Loire, was, in fact, nothing less than to try to sink a shaft in that river, or to drain the river itself. But this difficulty has been successfully grappled with, through the resources of science, boldly applied by M. Triger, an able civil engineer.

By means of the above frame of iron tubbing, furnished with an air-tight anti-chamber at its top, he has contrived to keep his workmen immersed in air, sufficiently condensed by forcing-pumps, to repel the water from the bottom of the iron cylinders, and thereby to enable them to excavate the gravel and stones to a great depth. The compartment at top has a man-hole door in its cover, and another in its floor. The men, after being introduced into it, shut the door over their heads, and then turn the stop-cock upon a pipe, in connection with the condensed air in the under-shaft. An equilibrium of pressure is soon established in the anti-chamber, by the influx of the dense air from below, whereby the man-hole door in the floor may be readily opened, to allow the men to descend. Here they work in air, maintained at a pressure of three atmospheres, by the incessant action of leathern valved pumps, driven by a steam-engine. While the dense air thus drives the waters of the quicksand, communicating with the Loire, out of the shaft, it infuses at the same time such energy into the miners, that they can easily excavate double the work without fatigue, which they could do in the open air. Upon many of them, the first sensations are painful, especially upon the ears and eyes, but, ere long, they get quite recon-

ciled to the bracing element. Old asthmatic men become here effective operatives; deaf persons recover their hearing, while others are sensible to the slightest whisper. The latter phenomenon proceeds from the stronger pulses of the dense air upon the membrane of the drum of the ear.

Much annoyance was at first experienced from the rapid combustion of the candles, but this was obviated by the substitution of flax for cotton thread in the wicks. The temperature of the air is raised a few degrees by the condensation.

Men, who descend to considerable depths in diving-bells, experience an augmentation of muscular energy, similar to that above described. They thereby acquire the power of bending over their knees strong bars of iron, which they would find quite inflexible by their utmost efforts, when drawn up to the surface.

These curious facts clearly illustrate and strongly enforce the propriety of ventilating apartments, by means of condensed air, and not by air rarefied with large chimney drafts, as has been hitherto most injudiciously, wastefully, and filthily done, in too many cases.

London,—

13, Charlotte-street, Bedford-square,

21st May, 1842.

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 312, Vol. XX.)

Mr. Lowe believed that there was an incorrectness in the statement, of the iron after being freed from its oxygen by the heat of the furnace, taking up a dose of carbon from the coke, thus becoming a carburet of iron, which is a fusible compound, and as such, fell melted into the hearth. On the contrary, he thought that the iron was combined with carbon in the ore, and that there

was not any necessity for the medium of the fuel to charge it with carbon.

In reply to "Why the ore required, or why the iron carried away any of the carbon of the fuel?"—Dr. Faraday stated, that the ore being essentially a carbonate of iron, the first action of heat, either in the mine kilns or in the furnace, was to draw off the carbonic acid and leave an oxide of iron, and then the further action of the fuel (besides sustaining a high temperature) was to abstract the oxygen of the oxide, and so to reduce the iron to the metallic state, after which a still further portion of the carbon of the fuel combined with the iron, bringing it into the state of easily fusible or pig-iron.

As carbon may be communicated to the iron in two ways, distinct in their nature, either by contact with solid carbon, as in the process of cementation, (that by which steel is commonly converted,) or from the carbonated gases, either carburetted hydrogen, or carbonic acid, which occupy nearly every part of the airway of the furnace, it would be desirable to distinguish, as far as may be in any furnace having a particular form or action, what proportion of the whole effect is due to the one mode of carbonization or the other.

Mr. Wallace stated, that the ore was a carbonate of iron, or a protoxide of iron and carbonic acid united, and not a carburet of iron, (or iron and carbon simply,) as was generally believed. In smelting, the carbonic acid was driven off, the simple oxide remaining; the oxygen of which, being carried off by the heat, left the pure iron, which, combining with the carbon of the coke, formed a fusible carburet of iron, or the pig-iron of commerce.

Mr. John Taylor observed, that his brother, Mr. Philip Taylor, being sensible of the advantages to be expected from the use of anthracite in smelting iron, made a series of experiments several years ago, from which he derived the opinion that the carbon absorbed by the metal, and which is necessary to produce it in the shape of pig-iron, must be presented in a gaseous state to the mass in fusion; and as Anthracite did not afford a sufficient supply of coal-gas, during combustion, to produce the proper

effect, he proposed to adopt a very ingenious method, by which this gas would have been thrown into the furnace in such proportions as might be found necessary, mixed with the common air employed as the blast.

Circumstances interrupted the course of these experiments, or it is possible that the use of Anthracite, for this important application, might have taken place at a much earlier period than it has happened to do.

February 15, 1842.

The PRESIDENT in the Chair.

"Description of Chelson Meadow Sluice."—By Theodore Budd,
Grad. Inst. C. E.

The sluice which is described in this communication, was erected from the designs of Mr. Rendel, for the Chelson Marshes in Devonshire, which, being very low, had previously suffered much from floods, but now are entirely relieved. The novelty in the construction consists in hanging each of the doors respectively by two hinged flat bars of iron, of 18 feet 6 inches, and 15 feet 3 inches in length, and thus, by placing the centre of motion so high above the centre of gravity of the doors, to give greater freedom of action than by the modes usually adopted in similar works.

The dimensions of all the parts, and the method of construction, are given in great detail, and are illustrated by a drawing.

Mr. Rendel explained, that the sluice-doors, which had been superseded by those described by Mr. Budd, were of the ordinary description, placed side by side. They were frequently hinge-bound and clogged up, which caused the land to be flooded sometimes for three months during the year. The hinges were attached, in the usual manner, to the frames, close at the head of the doors, and they required a pressure of at least 6 inches of water to act upon them either way. He considered the prin-

cipal advantages of these doors to consist in the freedom of action given by the length of the bar-hinges by which they were suspended, their giving the full extent of opening, and the pressure of 1 inch head of water, sufficing either to open or close them.

Mr. Prior inquired whether there was any similarity between these sluice-doors and that erected by the President near Blackfriars Bridge, at the bottom of Fleet Ditch. That door was so well hung as to be even acted upon by the wind; and the slightest pressure of water sufficed to open or to close it.

The President explained, that the principle was not the same; at the Fleet Ditch sluice double hinges were used, or rather hinges with a link between the part attached to the frame, and that which was screwed to the door;—that form of hinge always acted freely, and allowed the doors to open with a slight pressure.

“ On the mode practised in India for obtaining solid Foundations for Bridges, &c., in sandy soils, by means of Wells.”

By Captain Goodwyn, B. E., Assoc. Inst. C. E.

Piling for the foundation of buildings appears to be entirely unknown in Hindostan. The ordinary mode of securing a foundation, where the super-stratum is tenacious and rests upon loose sand, is to dig a well until water is reached; a curb of timber is then placed, and upon it a cylinder of brick, $7\frac{1}{2}$ feet exterior, and $3\frac{1}{2}$ feet interior diameter, is built to the height of 3 or 4 feet above the ground. As soon as the masonry has hardened sufficiently, the well-sinker fixes a plumb-line to the top of the cylinder as a guide, and descends withinside, carrying an instrument called a “ Phaora, or Mamooti,” somewhat similar in shape to a hoe; with this he excavates the earth until the water is too deep; he then commences the use of the “ Jham,” which resembles the “ Phaora ” in shape, but is about 36 inches long and 27 inches wide, and is suspended to a cord, passing over a pulley above the cylinder. Upon this instrument the well-sinker descends, and diving into the water excavates, with the “ Jham,”

the soft earth under the sides of the curb, and is, at intervals, drawn up with the instrument. The cylinder descends gradually from 6 inches to $2\frac{1}{2}$ feet per day, as the earth is withdrawn from beneath it, and relays of workmen keep it constantly going, lest the sand should settle around it, and cause it to hang up. The natives are very expert in this operation, and not unfrequently remain under water more than a minute at a time. The cylinders have been sunk as deep as 40 feet, but with extreme labour.

A series of these wells being sunk at intervals of 1 foot between them, they are filled with a grouting of lime and rubble-stone, and separately arched over; arches are then thrown transversely from the centre of each parallel pair, and another set of arches turned over the adjacent walls longitudinally; the whole is then covered with masonry, and the pier or other building raised upon it: such foundations are found to answer perfectly in situations where almost any other kind would be washed away.

The communication was accompanied by a drawing of the process, and of the tools used, showing also the modification of the system proposed by Colonel Colvin, of the Bengal Engineers, for obtaining foundations for a curtain, or line of wall, by sinking square masses of brick-work, with two or more wells in each, through which the workmen could excavate the soil.

In answer to questions from the President, Captain Goodwyn observed, that the greatest peculiarity of this system was, that the sinker worked under water: such had been their custom for ages. Upon this kind of foundation, many of the large fortresses in India were constructed, and they stood remarkably well; whereas if timber piles had been used, the white ant would have destroyed them in a short time.

Lieutenant Sale observed, that another main reason for not using piles was, that timber was scarce and dear, whereas labour was plentiful and cheap. Hence the general use of the brick cylinders.

Mr. Parkes conceived the most ingenious parts of the proceed-

ing to be, the sinking through the water, and thus avoiding the risk of bringing up large quantities of sand, and the combination of arches, for distributing the weight of the superstructure equally among the brick shafts. Such shafts had been used by the Chinese, and sunk in the same manner from time immemorial.

In answer to a question from the President, Mr. Simpson described the process now so much practised for sinking wells through bad strata, by means of cast-iron cylinders; excavating the earth from within the cylinder, by an instrument called a "miser," which is a conical iron shell, with a valve opening inwards; it is suspended by iron rods, $1\frac{1}{4}$ inch square, and worked from the level of the ground without pumping up the water: it is not uncommon to excavate to a depth exceeding 100 feet in that manner. The "miser" can bring up a cube yard of earth each time it is raised. Cast-iron cylinders are preferable to brick shafts, which frequently hang up, and in that case give much trouble, whereas if the iron cylinders do not descend freely, they will bear the application of considerable force to drive them down. They are frequently forced through the indurated ferruginous gravel. Light planking is also sometimes used, particularly in such cases as in the well he is now sinking at Chelsea, which is 20 feet square, lined throughout with 8-inch planking. It has reached the quicksand at the depth of 32 feet, and will be stopped there.

Mr. Davison has just completed a well at Messrs. Truman and Hanbury's brewery, with cast-iron cylinders, 8 feet diameter, and 193 feet deep, an account of which he promised to present to the Institution.

The President was now sinking a set of cast-iron cylinders through sand, which was liable to be washed away; they were to be filled with concrete, and used as the foundation for a light-house at the Point of Air. An account of the construction was, he believed, preparing for the Institution.

"An Historical Account of Copper Sheathing for Vessels."

By J. J. Wilkinson.

The two former papers by the same author, treated of Wood and Lead Sheathing for Ships : the present communication gives in the introduction a general account of copper as a metal ; the localities supplying it ; the uses to which it has been applied, from the earliest period to the present time ; and the relative estimation in which copper of various countries is held, on account of its degree of purity, its ductility, or its better preparation, in which latter particular British copper is stated to be pre-eminent.

An epitome is then given of a return to the House of Commons ; whence it appears that in 1839, into Swansea alone, there was imported 4,350 cwts. of unwrought metal, and 419,604 cwts. of ore, and that there was exported during the same year, of British metal, 153,742 cwts., and foreign metal 112,830 cwts.—Copper from Sweden is considered more malleable than that from Hungary, but the former is not so good as British metal, as it contains a portion of iron.

Copious extracts are made from "Knowles's Naval Architecture, whence is quoted the first recorded use of copper sheathing upon the "Alarm" frigate, in 1761 ; at that period it was believed that sea-water had little action upon pure copper, and the rapid decay of the partial sheathing of certain ships was attributed to the impurity of the metal. Experience showed, however, that pure copper, like that employed on the "Tartar," could be destroyed in the short space of four years, while the sheathing of the "Batavia," an old Dutch man-of-war, and of the "Plymouth" yacht, was perfect, after 24 and 27 years' service ; in both the latter there was an alloy of $\frac{1}{16}$ th part of zinc.

Much information is given on the rolling of copper sheets ; the dimensions ; the weight per square foot of different gauges, and the uses to which the various kinds are applied ; as also on the quantities of metal used for sheathing. The "Neptune," of 120 guns, was cased with 4738 sheets, weighing altogether 17 tons 19 cwts.

The use of copper sheathing is to protect the wood from destruction by the worm, and to prevent the adhesion of weeds, barnacles, &c., which impede the sailing of the vessel. On the first introduction of copper, it was used in conjunction with iron bolts and other fastenings; these soon oxidated, and serious accidents occurred. It was advised, in consequence, that all the bolts should be of copper or mixed metal. The attention of the Government was directed to the subject, and Sir Humphrey Davy was appointed to experiment upon specimens of metal of different qualities. He soon discovered, that when two dissimilar metals are in contact, and immersed in sea-water, a voltaic effect is produced, which occasions a rapid corrosion of the more oxidable metal, while the other remains uninjured. In 1824, Sir Humphrey Davy communicated to the Government, that he had discovered a means of preventing the corrosion of the copper, by rendering it electro-negative. This he proposed to effect by protectors of zinc, iron, or any other easily oxidable metal. After a variety of experiments he determined that the protectors should consist of six bars of cast-iron, whose united surface should be $\frac{1}{16}$ th part of the area of the copper exposed to the action of the sea-water; two of them were placed midships on the keel of the ship, two on the bows, and two on the stern, about three feet under water. As far as the philosophical fact was concerned, the result was conclusive, as the copper suffered no waste.

Inconveniences however arose, which had not been foreseen; as the copper did not oxidate, its whole surface was speedily covered with barnacles and sea weeds, which collected in such quantities as to impede the sailing of the vessels, and adhered so fast, that in removing them the copper was frequently torn away; the protectors were therefore abandoned, in 1826, for all vessels on service, but were still used for the ships lying up in harbour; the bottoms of these became, however, so foul, that, in 1828, the system was entirely abandoned.

After the protectors had been for some months on the ships' bottoms, it was found that on the outer surface a red oxide was formed, and beneath it, for some depth, a substance resembling

plumbago; this substance, having sulphate of iron for one of its constituents, when laid upon any inflammable body, caused spontaneous combustion: a similar result was obtained by Mr. F. Daniell in 1817, while experimenting upon cast-iron, by solution in diluted muriatic acid.

Protectors of various kinds have been tried in the French navy, and in the United States; but generally with doubtful success.

A list of all the patents for copper and other sheathing, as well as for means for preventing corrosion, &c., is then given at great length: the gradual progress of the application of copper sheathing, first to ships of the Royal Navy, then to Indiamen, to Transports, and finally to Merchant Ships, is then traced. It appears that of the vessels which enter the Thames, one-fifth are sheathed with copper and its alloys; of vessels at Liverpool, eight-tenths are coppered. The precautions for preserving uncoppered vessels from the "Teredo navalis" are then described: and coal-tar pitch is mentioned as the most effective substitute for sheathing.

Copper sheathing appears to be entirely neglected for vessels in the coal trade, although it is singular that the "Teredo" is found in every port to which coals are carried, south of the Tees; in the Thames, as high up as Gravesend, and northward as far as Whitby; traces of the ravages of the "Teredo navalis," and of the "Limnoria terebrans," have at various periods been found, from the North of Scotland and Ireland, on almost every coast to the Cape of Good Hope and Van Dieman's Land, in the Eastern hemisphere; and in the Western hemisphere, from the river St. Lawrence to Staten Island near the Terra del Fuego, almost in the Polar Sea; so that although this maritime scourge is rife in warm climates, yet cold latitudes are not exempt from it.

Mr. Lowe was pleased to find that the use of coal-tar pitch for shipping was advantageously mentioned: he was convinced that it would be found very superior to vegetable pitch: he had seen comparative experiments tried on board an India ship, and the result was, that the timber which had been coated with the former was preserved both from the worm and from decay, while that

which was covered with the latter had suffered from both. He attributed the preservative quality of the coal-tar pitch to the quantity of sulpho-cyanic, or sulpho-prussic acid, which it contained.

Mr. Horne had used coal-tar extensively on wood, but found that it produced decay, which he attributed to the ammonia contained in it.

Lieutenant Oldfield alluded to Renwick's Patent, for saturating timber with coal-oil : he had seen specimens of piles at New York, which, when prepared by Renwick's process, perfectly resisted the attacks of the "*Teredo navalis*," in the same situations where Kyanized piles had been entirely destroyed.

Mr. Bethell confirmed Lieutenant Oldfield's statement. Coal-oil was a powerful preservative when properly prepared and applied :—he objected to the use of ammonia in any shape, as it rotted timber very fast. In experiments he had made, previously to taking out his patent for preparing timber with coal-oil, he observed that wood coated with common coal-tar, soon turned brown, and decay ensued : ammonia produced the same appearance and effect. If any vegetable fibrous substance, such as peat, was sprinkled with ammonia, it speedily rotted, and became a rich black earth. In the mediterranean, the native ship-owners used nothing but coal-tar pitch for their vessels ; they were cleaned and well tarred twice a year, and the worm seldom made any ravages, although unprepared timber in those latitudes was destroyed in a very short time.

The refined coal-tar, as manufactured in London, is purified from ammonia by distillation, and found an excellent coating for wood. The oil of tar, used in Mr. Bethell's process, is likewise purified from ammonia.

Mr. Parkes conceived that diluted ammonia must be meant as recommended for agricultural purposes, and not the ammoniacal liquor as it came from the gas-works ; the former, when used with discretion, properly diluted, and to certain soils, was an active stimulant in cultivation, but the latter contained matter which was very prejudicial.

Mr. Bethell observed, that ammoniacal liquor, when diluted with three parts of water, had been found to succeed perfectly well with peaty soils. Nearly all the sal-ammoniac of commerce is now made from the ammoniacal liquor from gas-works.

Mr. Hawkins remarked, that it could be readily understood that the proportion of ammonia used, would regulate the effect to be produced; as in the case of gypsum, of which two bushels per acre was a good manure; but in some places fifteen or twenty bushels per acre had been tried, and of course a complete failure had ensued.

Mr. Parkes replied, that gypsum was commonly used in Yorkshire, and habit had dictated the proportions so well that it seemed to be the best manure the farmers possessed there.

Mr. Taylor recalled the conversation to the subject of the Paper on Copper Sheathing, from which many curious facts might be drawn. The ancient specimens of copper sheets had endured longer than the modern: the former contained an alloy of $\frac{1}{16}$ th part of zinc. The "Muntz" metal, which is now being extensively used, contains alloy of the same material, but in a larger proportion. The inequality of manufactured copper had perplexed the chemist and the manufacturer for full forty years; and after all their researches and experiments, it would appear that the chemistry of the manufacture of copper and of iron was not understood. Mr. Taylor had been consulted by Sir John Herschell on the subject, and he had recommended assaying the sheets instead of receiving them by the appearance of their surfaces, as was the usual mode. Dr. Faraday and Mr. Richard Phillips had made an extensive series of experiments for Mr. Vivian, and Mr. Farquhar had carefully analysed various specimens; but all these eminent men failed in discovering any chemical difference between the copper which had endured well and that which had been rapidly destroyed.

Sheets of copper rolled the same day, under apparently similar circumstances, differed materially in quality. In the process of "polling," which is carried on by stirring about the copper while in a fluid state, with poles of green wood, producing ebullition,

whether the operation is continued too long or too short a time, the metal becomes brittle and the quality cannot be recovered.

Less copper is now exported from Russia because the attention of the miners is directed to the gold mines. Mr. Taylor attributed the superiority of the quality of the foreign copper to the ore being smelted with charcoal, whereas English copper is smelted with bituminous coal, frequently containing sulphur.

NOTICE OF NEW WORKS.

The Society for the Diffusion of Useful Knowledge, in addition to the valuable Maps, Astronomical and Geographical, which are already before the public, have now in course of publication "a Series of Diagrams, illustrative of the principles of Mechanical Science and Natural Philosophy, with their practical applications, accompanied with short descriptions and explanations adapted to the purposes of instruction." We have not been furnished with any details of the plan proposed to be pursued by the editor of this work ; but, as respects the Diagrams, in Part I., now before us, which are on the scale beam or lever of the first order, suitable, as to size, for illustrating the principles of Mechanics, in a public lecture, we anticipate that they will be found extremely useful in schools, and tend greatly to assist the pupils in acquiring a correct knowledge of that most important branch of the arts and sciences,—Practical Mechanics.

We would recommend Messrs. CHAPMAN and HALL, the publishers, to reduce the price if possible, as the present cost will be a serious obstacle to the sale of the work.

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only on History, Poetry, and General Literature, but also on the various branches of Arts and Sciences; and, as a whole, must be considered a valuable auxiliary to the library, both of the admirer of *Belles Lettres*, and the enquirer after useful knowledge.

List of Patents

Granted by the French Government from the 1st of July to the 30th of September, 1840.

(Continued from Page 224, Vol. XX.)

- Dubourjal, of Paris, for metallic roofs of houses.
- Duchamp, of Paris, for a new fuel.
- Duclos and Peyle, of Lyons, for printing brocaded velvet.
- Dufeu, of St. Martin de Deuilly, for a machine for cleaning shoes.
- Dufour, of Trigny, for an improved motive power.
- Duperrier, of Paris, for an improved heating apparatus.
- Durand, of Puteaur, for a new mode of printing fabrics.
- Durosoy, of Tuchan, for a rotary steam-engine.
- Durot, of Bussy, for a crucible for extracting iron from blast furnaces.
- Dutot, of Domfront, for a process for weaving several pieces upon the same loom, and by one operation.
- Duvillard and Tallois, of Melun, for a new lock.
- Duvallier, of Paris, for a new button.
- Duvoir, of Paris, for an improved califyer.
- Egard, of Marsas, for a plough for excavating earth.
- Estique and Jacquemard, of Rheims, for a roving frame.
- Fabrique, of Grenoble, for an improved pump.
- Fagot, Senr., of Déville, near Rouen, for a frame for rolling printed calicoes.
- Farcot and Monestier, of Paris, for a new lock.
- Faure, of Nancy, for a mechanical lamp.
- Figeac and Reynié, of Toulouse, for a mode of manufacturing a refreshing beverage.
- Figuera and Co., of Paris, for a mode of manufacturing salts of ammonia.

- Fillion**, of Paris, for a process for the cutting of gloves.
- Finino**, of Paris, for a substance imitating bronze.
- Fontaine**, of Paris, for an instrument for setting lamp wicks.
- The Marquis de Forbin Tanson**, of Villelaure, for dessicating the roots of beetroot.
- Fouju**, of Paris, for improvements in the manufacturing of bread and brandy from corn.
- Fournel and Laval**, of St. Chamond, for improvements in Jacquard looms.
- Fouschard Brothers**, of Neuilly, for the dessication and bleaching of syrups of fecula.
- François**, of Paris, for green grease, for carriages.
- Frolick**, of Paris, for perpetual motive power.
- Funomet de Changy**, of Montmartre, for a new mode of transmitting motion.
- De Galbois**, of St. Etienne, for a new mode of drawing waggons up an incline.
- Galbrenner**, of Paris, for improved dressing cases.
- Gand**, of Paris, for improvements in the manufacturing of violins and counter-basses.
- Gaullier**, of Lyons, for a new measure for coats.
- Gengembre**, of Paris, for a new construction of wheels.
- Gentilhomme**, of Paris, for an improved turbine.
- Geoffroy Féret**, of Beauvais, for a new method of dyeing bone buttons.
- George**, of Paris, for a machine for combing flax.
- Geslin**, of Paris, for a machine called an "historical clock."
- Gille**, of Paris, for a reflector, for the purpose of throwing light on the numbers of houses.
- Girod**, of Morez, for a new system of bells.
- Gloquet**, of Rouen, for an instrument for mechanical calculation.
- Goldenberg and Co.**, of Strasburg, for an improved coffee mill.
- Goodsell**, of Paris, for a new mode of cleaning fibrous substances.
- Gosselin**, of Paris, for a mode of applying marble facings on a metallic carcass.
- Gournay**, of Paris, for a new application of pumps to the washing of wool.

Graffard, of Paris, for a new mode of manufacturing moulded buttons.

Grimaud, Chambardel, et Frère, of Poitiers, for a new distilling apparatus.

Griolel, of Paris, for improvements in the combing of wool.

Guardet, of Paris, for a new method of lighting.

Guédé, of Montdidier, for a loom for weaving figured fabrics.

Guérin, of Passy, for a new apparatus for straightening disformed limbs.

Guerrier, of Paris, for a new garden chair.

Guillini, of Nyons, for a machine for the twisting of fibrous substances.

Guinier, of Paris, for improved water-closets.

Guyot, of Paris, for a telegraph, to be used by night.

Hainsselin, of Paris, for improvements in the manufacturing of stearic candles.

Hainsselin, of Paris, for a machine for chopping tallow.

Henri, of Batignolles, near Paris, for a method for preventing the escape of water from steam-engines.

Hugonis, of Bordeaux, for pipes in baked earthenware.

Hunt, of Paris, for impermeable shoes.

Huson, of Bar-le-duc, for a mill for linseed and mustard seed.

Jaillour, of Paris, for improved carriage wheels.

Jarre, Junr. of Montpellier, for a new kind of gun.

Jarry, of Paris, for roads of bituminated wood, and new vehicles.

Jeanningros, of Ornans, for a new description of razor.

Jeunet, of Paris, for a new mode of manufacturing matches.

Joannis, of Paris, for mechanism for trousers straps, belts, stays, &c.

Jomeau, of Paris, for iron beams for bridges and other purposes.

Jonnoux, of Rheims, for spinning card with a continuous action.

Jourdain, of Paris, for a machine for raising river water.

Jourdan, & Co., of Cambrai, for an application of the Jacquard to bobbin-net frames.

Jourdane, of Paris, for an improved spring for carriages.

Joyeux, eldest Son, of Nîmes, for improvements on the English frame for making stockings.

- Jusserand**, of Lyons, for roofs in iron and cast-iron.
- Keene**, of Paris, for a new system of lighting streets and houses.
- Koenig**, of Meaux, for a machine for thrashing corn.
- Labrousse**, of Paris, for a metallic ink-stand.
- Lacarrière**, of Paris, for mouldings in solid iron, covered with brass.
- Lambert**, of Rheims, for a percussion gun.
- Lamoureux**, of Vervins, for a cast-iron stove.
- Landraud and Marcel**, of St. Etienne, for improvements in fire-arms.
- Lapeyre**, of Libourne, for a mechanical instrument for calculating.
- Lapointe**, of Paris, for improved measures for liquids.
- Larivière**, of Paris, for improved buckles.
- Laubereau**, of Paris, for a ventilator for drying four pieces of cloth by one operation.
- Laurent Brothers**, of Toulouse, for a new lamp burner.
- Lebet and Colifrat**, of Paris, for a new alloy.
- Lefort and d'Orleans**, of Paris, for an umbrella slide.
- Legrand**, of Paris, for the discolouring of linseed oil.
- Legras**, of Paris, for a new busk for stays.
- Legris**, of Paris, for a new musical instrument, called *ornanino*.
- Lemercier and Thierry**, for a machine for printing tissues and papers.
- Lescaral**, of Beauvais, for a mode of manufacturing *Utrecht* velvet.
- Lesueur**, of Paris, for a new application of glass and crystal, for architectural ornaments.
- Lesueur**, of Paris, for improved boxes for wheels.
- Lenfle**, of Grenelle, near Paris, for a new ramrod.
- Levique**, of Marseilles, for a new motive power.
- L'Hermite**, of Saumur, for an improved fire-arm.
- De Libert**, of Chenée, for a new system of road.
- De Ligny**, of Paris, for a new oven for plaster.
- De Livac**, of Sarrians, for a mode of dessicating the roots of beetroot.
- Loddé**, of Paris, for an improved feather broom.
- Loire and Semé**, of Paris, for an improved billiard table.
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Lorilleux-Vinçard, of Paris, for a new mode of casting printing type.

Lorin, of Paris, for a machine for extracting the juice of beetroot.

Loyer, of Paris, for inexplosible steam-engines.

Lucas and Scordel, of Paris, for a pump, applicable to ink-stands.

Luc, of Paris, for an acoustic apparatus.

Machly, of Rouen, for improved gas, for illumination.

Magny, of Vandevanne, for an improved plough.

Maillot, of Paris, for a new spring for trousers straps, belts, &c.

Maitre, of Villatte, for bituminous tiles.

Manchon, of Paris, for an impermeable fabric for covering steel busks.

Manigot, of Nevers, for alphabets and cyphers in sugar-plums.

De Manneville, of Gonneville, for an apparatus for cooperage.

Mantelet, of Paris, for an improved batten.

Martin, of Paris, for a new mode of heating stoves.

Martin, of Besançon, for improvements in the manufacturing of bricks.

Martin, of Morizécourt, for improvements in the manufacture of spoons and forks.

Martin and Moisson, of Passy, for a new mode of manufacturing hydrochloric acid.

Martinet, of Paris, for an improved water-closet.

Mathieu, of Paris, for a new mode of traction.

Mathieu, of Paris, for a new system of roads.

Maurel, of Vienne, for a new mode of hanging rooms with paper.

Mauzaize, of Lèves, for a new gate for hydraulic wheels.

List of Patents

That have passed the Great Seal of IRELAND, from the 17th April to the 18th of May, 1842, inclusive.

To Alphonse Rene Le Mire De Normandy, of Redcross-square, in the city of London, Doctor of Medicine, for improvements in the manufacture of soap.—Sealed 19th April.

Joseph Henry Tuck, of the New North-road, Hoxton, in the county of Middlesex, engineer, for improvements in apparatus or machinery for making or manufacturing candles.—Sealed 19th April.

George Wildes, of Coleman-street, in the city of London, merchant, for improvements in white lead,—being a communication from a foreigner, residing abroad.—Sealed 19th April.

John Juckes, of Putney, in the county of Surrey, Gent., for improvements in furnaces or fire-places.—Sealed 21st April.

William Brunton, of Neath, in the county of Glamorgan, engineer, for an improved method or means of dressing ores, and separating metals or minerals from other substances.—Sealed 26th April.

James Hunt, of 10, Whitehall, in the county of Middlesex, Gent., for improvements in the manufacture of bricks.—Sealed 3rd May.

William Newton, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, engineer, for an improved machine or apparatus for weighing various kinds of articles and goods,—being a communication from a foreigner, Andre Weschniakoff, residing abroad.—Sealed 7th May.

Edward Morewood, of Winchester-buildings, Great Winchester-street, in the city of London, Esq., for an improved mode of preserving iron and other metals from oxydation or rust,—being a communication from a foreigner, residing abroad.—Sealed 4th May.

James Murray, of Merrion-square, in the city of Dublin, Knt. and M. D., for an improved method of combining various materials, in a manner not hitherto in use, for the purpose of manure.—Sealed 12th May.

Peter Kagenbusch, of Wetter on Rhur, in Westphalia, in the Kingdom of Prussia, now residing in the parish of Whitby and county of York, in England, for improvements in the dyeing of wool, woollen cloths, cottons, silks, and other fabrics and materials.—Sealed 11th May.

List of Patents

Granted for SCOTLAND, subsequent to April 22nd, 1842

To John Venables, of Burslem, in the county of Stafford, earthenware manufacturer, and John Tunnicliff, of Burslem, aforesaid bricklayer, for a new and improved method of building and constructing ovens, used by potters and china manufacturers in the firing of their wares.—Sealed 25th April.

William Newton, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, civil engineer, for an improved machine or apparatus for weighing various kinds of articles & goods,—being a communication from abroad.—Sealed 27th April.

Joseph Atkinson, of Braham Hall, near Harrowgate, in the county of York, farmer, for improvements in thrashing and winnowing machines.—Sealed 4th May.

John Carr, of North Shields, in the county of Northumberland, earthenware manufacturer, and Aaron Ryles, of the same place, agent, for an improved mode of operating in certain processes, for ornamenting glass.—Sealed 6th May.

Henry Barron Rodway, of Birmingham, in the county of Warwick, wine merchant, for improvements in the manufacture of horse-shoes.—Sealed 12th May.

James Murray, of Merrion-square, in the city of Dublin, Knt. and M.D., for an improved method of combining various materials, in a manner not hitherto in use, for the purpose of manure.—Sealed 12th May.

John George Bodmer, of Manchester, in the county of Lancaster, engineer, for certain improvements in machinery or apparatus for cleaning, carding, roving, and spinning cotton and other fibrous substances.—Sealed 16th May.

Peter Kagenbusch, of Wetter on Rhur, in Westphalia, in the Kingdom of Prussia, dyer, but now residing in the parish of Whitby, in the county of York, in England, for improvements in the dyeing of wool, woollens cloths, cotton, silks, and other fabrics and materials.—Sealed 17th May.

New Patents

SEALED IN ENGLAND.

1842.

To Henry Barclay, of Bedford-row, for a composition or compositions, applicable, as tools or instruments, for cutting, grinding, or polishing glass, porcelain, stones, metals, and other hard substances.—Sealed 30th April—4 months for enrolment.

John Robinson, of Watney-street, Commercial-road East, engineer, for improvements in windlasses and capstans.—Sealed 3rd May—6 months for enrolment.

John Railton, of Blackburn, machine maker, for certain improvements in machinery or apparatus for weaving,—Sealed 3rd May—6 months for enrolment.

Godfrey Wetzlar, of Middleton-square, Clerkenwell, Master of Arts, for improvements in rendering fabrics waterproof,—being a communication.—Sealed 7th May—6 months for enrolment.

Joseph Warren, of Heybridge, Essex, agricultural implement maker, for certain improvements in ploughs.—Sealed 9th May—6 months for enrolment.

Francis Prime Walker, Junr., of Manchester, coal merchant, for certain improvements in the manufacture of candles, candle-sticks, or candle-holders, and in the apparatus connected therewith.—Sealed 9th May—6 months for enrolment.

George Hawe, of Manchester, Gent., for certain improvements in machinery or apparatus for sweeping and cleaning chimneys and flues.—Sealed 9th May—6 months for enrolment.

Thomas Edge, of Great Peter-street, Westminster, gas apparatus manufacturer, for certain improvements in apparatus for measuring gas water and other fluids.—Sealed 9th May—6 months for enrolment.

Samuel Hall, of Basford, civil engineer, for improvements in the combustion of fuel and smoke.—Sealed 9th May—6 months for enrolment.

Jacob Wilson, of Wigmore-street, Cavendish-square, upholsterer,

for certain improvements in bedsteads.—Sealed 9th May—6 months for enrolment.

William Sanderson, of Aldermanbury, silk manufacturer, for improvements in weaving fabrics, to be used for covering buttons.—Sealed 9th May—6 months for enrolment.

John Melville, of Upper Harley-street, Esq., for certain improvements in propelling vessels.—Sealed 11th May—6 months for enrolment.

John Browne, of Brighton, Gent., for improvements in the manufacture of mud boots and overalls.—Sealed 12th May—6 months for enrolment.

Thomas Williams, of Bangor, smith, for an improved churn.—Sealed 17th May—6 months for enrolment.

William Brunton, of Neath, Glamorgan, civil engineer, for an improved method or means of dressing ores, and separating metals or minerals from other substances ;—for colonies only.—Sealed 19th May—4 months for enrolment.

Joseph Gibson, of Birmingham, manufacturer, for certain improvements in axletrees and axletree boxes.—Sealed 23rd May—6 months for enrolment.

John Benner Lawes, of Rotherhampstead, Hertfordshire, Gent., for certain improvements in manures.—Sealed 23rd May—6 months for enrolment.

James Pilbrow, of Tottenham, engineer, for certain improvements in steam-engines.—Sealed 23rd May—6 months for enrolment.

John Bishop, of Poland-street, jeweller, for a new or improved construction of brake apparatus, applicable to railway carriages.—Sealed 23rd May—6 months for enrolment.

Thomas Middleton, of Loman-street, Borough, engineer, for an improved method of preparing vegetable gelatine or size, for paper, and also an improved mode of applying the same in the manufacture of paper,—being a communication.—Sealed 23rd May—6 months for enrolment.

William Tudor Mabley, of Henrietta-street, Covent-garden, for improvements in machinery or apparatus for making nails,—being a communication.—Sealed 23rd May—6 months for enrolment.

- Benjamin Cook, Jun.,** of Birmingham, brass-founder, for improvements in the construction of bedsteads, both in metal and wood.—Sealed 23rd May—6 months for inrolment.
- Frederick Goos,** of Manchester, Jacquard machine maker, for certain improvements in the Jacquard machine, or apparatus to be used or employed in looms for weaving.—Sealed 23rd May—6 months for inrolment.
- James Murray,** of Merrion-square, Dublin, Knt. and M.D., for an improved method of combining various materials, in a manner not hitherto in use, for the purpose of manure.—Sealed 23rd May—6 months for inrolment.
- William Geeves,** of Old Cavendish street, Gent., for improvements in machinery for cutting cork.—Sealed 24th May—6 months for inrolment.
- James Stewart,** of Osnaburgh-street, Regent's-park, piano-forte maker, for improvements in hinges for piano-fortes, and other purposes.—Sealed 24th May—6 months for inrolment.
- Thomas Waterhouse,** of Edgely, Cheshire, manufacturer, for a certain improvement or improvements in machinery for carding cotton, wool, flax, silk, and similar fibrous materials.—Sealed 24th May—6 months for inrolment.
- Joseph Duce,** of Wolverhampton, Staffordshire, lock manufacturer, for an improved lock, and key to be used therewith, and an improved slide bolt for the said lock, applicable also to other purposes.—Sealed 24th May—6 months for inrolment.
- James Boydell, Junr.,** of Hope Farm Works, near Dudley, Staffordshire, iron master, for improvements in the manufacture of keel plates for vessels, iron gates, gate posts, fencings, and gratings.—Sealed 24th May—6 months for inrolment.
- James Potter,** of Manchester, manufacturer, for certain improvements in machinery for spinning cotton, flax, and other fibrous substances.—Sealed 25th May—6 months for inrolment.
- Peter Kagenbusch,** of Whitby, Yorkshire, dyer, for an improvement in the dyeing of wool, woollen cloths, cottons, silks, and other fabrics and materials.—Sealed 26th May—6 months for inrolment.
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CELESTIAL PHENOMENA FOR JUNE, 1842.

D. H. M.		D. H. M.	
1	Clock after the sun 2m. 35s.	—	Mercury passes mer. 1h. 30m.
—	☿ rises 0h. 23m. M.	—	Venus passes mer. 1h. 30m.
—	☿ passes mer. 6h. 3m. M.	—	Mars passes mer. 0h. 1h.
—	☿ sets 11h. 54m. M.	—	Jupiter passes mer. 1h. 30m.
6 51	☿ in ☐ or last quarter.	—	Saturn passes mer. 1h. 30m.
2 4 22	♂ in conj. with Vesta, diff. of dec. 2. 39. S.	—	Georg. passes mer. 1h. 30m.
11 7	Her. in conj. with the ☿ diff. of dec. 6. 6. S.	4 39	Vesta in conj. with the ☿
3 3	☿ in Perihelion	13 23	☿'s first satt. will im.
5	Clock after the sun 1m. 57s.	15	Clock before the sun, 1h. 1m.
—	☿ rises 1h. 22m. M.	—	☿ rises, 11h. 53m. M.
—	☿ passes mer. 8h. 51m. M.	—	☿ passes mer. 5h. 59m. A.
—	☿ sets 4h. 38m. A.	—	☿ sets 11h. 49m. A.
7 11 29	☿'s first satt. will im.	—	Occul. B. Virginis, in 15m. em. 12h. 12m.
8 10 14	Ecliptic conj. or ☉ new moon.	4 52	☿ in ☐ or first quarter.
8 19 3	♂ in conj. with the ☿ diff. of dec. 1. 48. S.	17 4 2	♂ in the descending node
10	Clock after the sun, 1m. 1s.	19 13 16	Her. in ☐ with the ☉
—	☿ rises 4h. 54m. M.	20	Clock before the sun, 0h. 2m.
—	☿ passes mer. 1h. 33m. A.	—	☿ rises 5h. 20m. A.
—	☿ sets 9h. 59m. M.	—	☿ passes mer. 9h. 22m. A.
10 6 49	♂ in conj. with the ☿ diff. of dec. 0. 38. N.	—	☿ sets 0h. 48m. M.
7 59	♀ in conj. with the ☿ diff. of dec. 0. 54. N.	21	Occul. A. Ophiuchi, in 7h. 2m. em. 8h. 7m.
11 10 4	♂ greatest Elong. 24. 21. E.	22 9 22	☉ enters Cancer: Summer mences
12 6	☿ in Perigee.	15 18	☿'s first satt. will im.
13	Occul. Leonis, im. 7h. 13m. em. 8h. 46m.	22 9 22	Ecliptic oppo. or ☉ full moon
14	Mercury R. A. 7h. 14m. dec. 23. 1. N.	11 29	☿'s second satt. will im.
—	Venus R. A. 7h. 22m. dec. 23. 41. N.	23 5 56	♂ in conj. with the ☿ diff. of dec. 1. 23. N.
—	Mars R. A. 5h. 43m. dec. 24. 7. N.	9 46	☿'s first satt. will im.
—	Vesta R. A. 5h. 30m. dec. 21. 30. N.	21 35	☿ in conj. with ☿ diff. of dec. 0. 8. S.
—	Juno R. A. 16h. 2m. dec. 2. 44. S.	24 15 2	☿ stationary
—	Pallas R. A. 3h. 2m. dec. 0. 31. S.	25	Clock before the sun, 2m. 35s.
—	Ceres R. A. 4h. 50m. dec. 21. 5. N.	—	☿ rises, 9h. 58m. A.
—	Jupiter R. A. 19h. 30m. dec. 22. 1. S.	—	☿ passes mer. 1h. 49m. M.
—	Saturn R. A. 18h. 54m. dec. 22. 19. S.	—	☿ sets, 6h. 10m. M.
—	Georg. R. A. 23h. 54m. dec. 1. 25. S.	5 22	☿ greatest Hel. Lat. N. 4
		6 59	♂ in conj. with the ☉
		27 7 53	♂ in Aphelion.
		20	☿ in Apogee.
		29 13 31	☿'s third satt. will im.
		29 14 3	☿'s second satt. will im.
		29 20	Her. in conj. with the ☿ diff. of dec. 6. 15. S.
		30 11 41	☿ in ☐ or last quarter
		11 41	☿'s first satt. will im.

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No. CXXVII.

Recent Patents.

To WILLIAM LEWIS RHAM, of Winkfield, in the county of Berks, clerk, for certain improvements in machinery or apparatus for preparing land, and sowing or depositing grain, seeds, and manure.—[Sealed 23rd May, 1841.]

THESE improvements in machinery or apparatus for preparing land, and sowing or depositing grain, seeds, and manure, consist in the peculiar construction of a machine, suited to the performance of the several operations of preparing the surface of the soil, dibbling the ground for the reception of seeds, and of depositing seeds and manure in the dibbled holes with certainty and regularity. This machine, (with suitable appendages,) is also capable of being adapted to the ordinary operations of scarifying, drilling, and hoeing; and of clearing the ground from weeds, stubble, or roots.

In Plate XVI., fig. 1, is a vertical section, taken longi-
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tudinally through the improved machine ; fig. 2, is a horizontal view, as it would appear from above ; and fig. 3, is a vertical section, taken transversely through the machine behind the dibbles ; in which several figures, the same letters of reference indicate the same parts of the machine.

A rectangular frame of iron *a, a, a, a*, supports the whole of the mechanism, and as a carriage, runs upon four wheels. The larger or hinder wheels are fixed by keys, or otherwise, to a rotary axle *b, b*, which axle necessarily revolves as the carriage passes over the ground, and from this rotary axle the moving power is communicated for working the operative parts of the machine. The smaller or fore wheels revolve loosely upon the ends of a bent shaft *c, c*, affixed to a circular plate *d*, which plate *d*, and shaft *c*, have a vertical axle *e*, fixed in them, turning in the front part of the frame *a* ; and at the top of this axle a toothed wheel *f*, is keyed, for the purpose of being acted upon by an endless screw *g*, which turns the wheel and axle *f, e*, and thereby steers or inclines the position of the shaft *e*, of the fore wheels, according to the direction desired to be given to the carriage.

Long curved levers *h, h*, hang upon a shaft *i, i*, at the hinder part of the frame, and are braced together in front by bars *j, j* ; these levers carry the crank axle *k*, designed to work the dibbles. The bars *j, j*, are also employed to hold the angular shoes or pressers *a*, which precede the dibbles, for the purpose of working the soil and producing a smooth furrow, where the dibble holes are to be made. These shoes are fastened to the bars *j, j*, by clamps and keys, as shewn in fig. 1. The rotary motion of the crank axle *k*, is derived from a toothed wheel *l*, fixed on the shaft *b*, of the running wheels ; the teeth of the wheel *l*, taking into a pinion *m*, keyed upon a short axle appended to the under sides of the levers *h*. Upon this axle is also affixed a

toothed wheel *n*, taking into a pinion *o*, keyed on the end of the crank axle. The ends of the levers *h*, *h*, are formed into bent arms *p*, *p*, standing up vertically. To the upper parts of these bent arms, a transverse horizontal shaft *q*, is attached, and upon this shaft a series of small levers *r*, *r*, *r*, *r*, hang loosely. Each of these small levers is connected at its end by a joint to the upper part of one of the vertical shafts of the dibbles *s*, *s*, *s*, *s*. To these small levers there are also connected severally, by joints, one of the crank rods *t*, *t*, *t*, *t*, which extend from the several cranks on the shaft *k*.

It will now be perceived that, as the machine passes over the ground, the rotation of the axle *b*, of the running wheels, will, by the train of toothed gear *l*, *m*, *n*, and *o*, as described, cause the crank axle *k*, to revolve in an opposite direction to that of the running wheels; and in so doing, through the agency of the rods *t*, *t*, *t*, *t*, to raise and depress the small levers *r*, *r*, *r*, *r*, successively, by which the dibbles *s*, *s*, *s*, *s*, will be forced down into the ground, and lifted up after having made the dibble holes.

In order to avoid any strain to which the lever *r*, might be subjected by the point of the dibble meeting with a stone or other hard substance in the ground, near the end of the lever *r*, there is a joint, allowing it to give way under any occasional extraordinary resistance; but this, at all other times, is kept firm by a powerful spring, acting upon its upper edge. For the purpose of communicating a vibratory motion to the shaft of the dibble *s*, from the crank rod *t*, a strap piece *u*, having a forked end, connects the dibble shaft and the crank rod together; and a pin, set into the shaft of the dibble and passed through slots in the sides of the fork, confines their actions and produces a parallel motion between the strap *u*, and the lever *r*, and thereby moves the dibble up and down. By the rotation of the crank *k*, and the action of the compound levers described,

the dibble shaft will be brought out of its perpendicular position into the inclined situations, shewn by dots in fig. 1, and made to describe a curve; but as the carriage, at the same time, is moving onward, the point of the dibble will be rendered nearly stationary, (though not perfectly so,) as to the spot of ground with which it is brought in contact. In order, therefore, to prevent the point of the dibble, by a slight movement, raking a curved recess in the ground, or its shaft being bent by the resistance as the carriage advances, a small degree of vibratory action or play is allowed to the shaft of the dibble in the forked end of the strap *u*, which is supported and regulated by the elastic force of a spring *v*, affixed to the shaft of the dibble, and acting against the end of the forked strap. By these means, the point of the dibble, when pushed into the ground by the descent of the crank, will be made to remain in the same spot until it is drawn up by the ascent of the crank in the opposite part of its rotation.

Whilst the point of the dibble is in the ground, it performs a rotary movement upon its shaft, which is effected by the following means:—The construction of the dibble is shewn in the detached vertical view, fig. 4, which exhibits the dibble and the depositing valves of the machine, partly in section, and upon an enlarged scale; and fig. 5, is a view of the same, as seen from above. The bulb or point of the dibble, is formed at the bottom of a tubular socket, which may be called the dibble shank. Into this tube is inserted the lower part of the dibble-shaft, which is connected at top to the lever *r*, and the shaft and shank are held together by a pin passed through the shank, which acts in a circular groove, in the lower part of the shaft, as shewn in the section. At the upper part of the shank there are cross-arms *w, w*, one of which arms, (whilst the dibble is stationary in the ground,) by the forward progress of the carriage, is

acted upon by a little curved tappet pin *x*, fixed in a horizontal guide-plate *x*, (see fig. 1, and 2,) which tappet pin, by striking against the arm *w*, as the carriage advances, causes the shank of the dibble to be turned one quarter round. The object of this rotary movement, given to the dibble, is to produce smoothness in the dibble-hole, and prevent the dibble drawing up any portion of the earth as it rises.

The positions of the hoppers and valves, by which the seeds are deposited in the dibble-holes, are shewn in figs. 1 and 2, and upon a larger scale at *b*, *c*, *d*, &c., in figs. 4 and 5.

The hopper *b*, made of metal, or any other suitable material, containing the seeds, is contracted at bottom, and its lower aperture is closed by a tumbler-valve *c*, which is a cylinder, having a small recess to receive the proper quantity of seed to be delivered at each operation through the spout *d*. The tumbler valve *c*, is made to turn upon its axis, by means of a rod *e*, connected at one end to a crank, on the end of the axle of the tumbler, and at the other end to the moveable shield *f*, which encloses the spout.

The working of this shield and tumbler-valve, is effected by a rod *g*, attached at one end, by a socket and joint, to the shank of the dibble, and at the other end, by a joint, to the moveable shield *f*. As the dibble vibrates, in the manner described, in reference to fig. 1, the shield *f*, will be made to move upon its joint-pin *h*, into the position shewn by dots in fig. 4, and, consequently, through the agency of the rod *e*, bring round the tumbler-valve. The seed, held in the recess of the tumbler *c*, will, by these means, be let fall into the spout *d*, but at that instant the shield, being raised, will not allow the seed to pass out below. When, however, the dibble comes to its vertical

or quiescent situation in the ground, as described, the shield will be thrown back, as in fig. 4, and the seed pushed, by the lower part of the spout, through the aperture, at bottom, into the hole in the ground, made by the preceding operation of the dibble; and this deposition of the seed, in the previously dibbled hole, will be effected with the most perfect exactness, by the careful adjustment of the length of the rod g, as seen in fig. 1.

Behind the seed-hopper, a similar hopper and valve, of larger dimensions, is placed for the delivery of manure.—i, is the hopper containing the manure; k, the tumbler-valve, by the turning over of which, the required quantity of manure is delivered into the spout l. The moveable shield m, is worked by a rod n, connected to the moveable shield f, of the seed hopper; and, consequently, as the seeds are deposited, by the shield f, in one dibbled hole, the manure is pushed out of the shield m, in a similar way, into the dibbled hole, previously supplied with seed.

Hence it will be perceived, that as the operations of the dibble, the seed-valve, and the manure-valve, are connected together and depend upon each other, they will act simultaneously.

The depth to which the dibble shall be allowed to penetrate into the ground, may be regulated by turning the pinion o, o, which takes into the segment racks on the edges of the arms p, p, of the levers h, h, as shewn in figs. 1 and 2. This is done by means of a handle, on the longitudinal shaft p, on the side of the machine, which carries a bevil-pinion upon its end, taking into a corresponding pinion, on the end of the transverse shaft of the pinion o, o; and when the required position of the levers h, h, and their appendages, is determined, they are held fast, in that position, by a ratchet and catch q, which keeps the dibles at their desired height.

The centres of the shaft *i*, whereon the levers *h*, *h*, hang, of the driving-wheel *l*, and of the pinion *m*, being nearly in a line, a small degree of elevation and depression of the levers *h*, *h*, is allowed, without throwing the driving-wheel *l*, and pinion *m*, out of gear; but if the levers are raised beyond a certain height, the pinion *m*, will be drawn away from the teeth of the driving-wheel, when the operating parts of the machinery will be raised from the ground, and their evolutions immediately stopped. The carriage may then be moved upon its wheels from place to place, without inconvenience, the dibbles and valves remaining quiescent.

In order to complete the operation of sowing, a series of forked rakes *r*, are attached to the back part of the machine, immediately behind the manure hoppers, (shewn detached at fig. 6,) for the purpose of raking the earth over the holes in which the seeds and manure have been deposited; and after these, a roller *s*, is made to follow, the axle of which turns in arms or bearings, extending from the under part of the machine, for the purpose of pressing the ground.

The steering or forward direction of the carriage before alluded to, is effected by turning the handle *t*, which works the horizontal shaft *u*, *u*, extending over the machine, the end of that shaft carrying the endless screw *g*, before mentioned.

This improved construction of feeding-valves, for depositing seeds or manure, as above described, may be adapted to any common drill, and opened and shut, at regular periods, by connecting the rods *g*, and *n*, or either of them, with a crank, moved by any convenient means; and by removing the shoes or pressers *a*, which are placed in front of the dibbles, and attaching to the bars *j*, *j*, tools, similar to those shewn detached at figs. 7 and 8, the machine may be converted into a scarifier, skuffler, or hoe, by which the surface of the land may be cleared of weeds, and laid open for the operation of the drill or the dibble.

The peculiarly-formed tool, represented at fig. 8, may be applied, with great advantage, as a harrow-tine, or as a coulter to a plough, for removing and turning over any weeds or other obstructions on the land.—[*Inrolled at the Petty Bag Office, November, 1841.*]

Specification drawn by Messrs. Newton and Son.

To JOHN WHILE, of Burton-in-the-Wolds, in the county of Leicester, farmer, for his invention of an improved horse-hoe, for use in agricultural pursuits.—[Sealed 29th September, 1841.]

THIS improved horse-hoe consists in a peculiar and novel arrangement of apparatus, containing vibratory cutters, moving laterally, whereby one or more rows of turnips or other plants may, whilst growing, be hoed or cut cross-ways of the drilled line, and the land hoed lengthways at the same time, between the lines of drills, for the purpose of being cleared of weeds.

In Plate XVI., fig. 1, represents a side elevation of the machine, having two vibratory hoes or lateral cutters; fig. 2, is a horizontal or bird's-eye view of the same; and fig. 3, an end elevation, as it would appear from the back part of the machine, the handles being in section.

It will be seen, on inspecting the horizontal view, fig. 2, that the frame-work consists of three straight longitudinal iron bars *a, a, a*, which are connected together by transverse bars or rods *b, b*, securely fixed to the central longitudinal bar, and toward their ends, to the longitudinal side-bars, by means of screws, bolts, and nuts, wedges, or any other convenient mode of fastening the parts together.

At the front extremity of the central longitudinal bar *a*, is placed the tug-iron *c*, from which the horse or horses are

to draw. The running-wheels *d, d*, are securely fixed, by means of screw-nuts, or other contrivances, on to the horizontal axle *e*, which axle is connected to the framing by pendant bracket-arms *f, f*, and *g*, keyed into the longitudinal bars.

Transverse bars *h, h*, passing through sockets in the framing or longitudinal bars *a, a, a*, and properly secured thereto, carry, at their outer extremities, scrapers *i, i*, for the purpose of cleaning off any clods of earth which might otherwise adhere to the rims of the running-wheels, and impede their progress, or cause the progress to become irregular.

The blades of the hoes or cutting instruments, which cut lengthways of the furrows, for the purpose of clearing the land from weeds, are shewn at *j, j*, and *k, k*. They should be of different shapes, as represented in fig. 2, but their form is not of importance. The blades *j, j*, are, by means of their vertical stems, affixed in pairs, by keys or other means, to sockets, in the outer longitudinal bars of the frame-work *a, a*, and are so placed as to form an opening or space between them, as seen in the back view of the machine, at fig. 3; which opening or space, is for the purpose of allowing the blades to pass along the ground, so as to leave the row of drilled turnips untouched by them. This pair of hoes is represented detached, in elevation, at fig. 4. The blade of the other hoe *k*, is spear-pointed, and fixed, by its stem, to the middle longitudinal bar, in a similar way.

The stems of the transverse or vibratory cross-cutting hoes *l, l*, (represented in elevation, in fig. 5, and in plan, at fig. 6,) are suspended by joints from pendant bracket-arms *m, m*, as shewn in the machine, at figs. 1 and 3; which bracket-arms are held in sockets, and keyed at the hinder parts of the two outer longitudinal bars, forming

the frame-work. These hoes *l, l*, are made to oscillate laterally, toward the right and left, on their joints, (as shewn by dotted lines, in fig. 3,) by the following means:—

Two longitudinal shafts *n, n*, extend along the under part of the frame, on the same level as that of the axle of the running-wheels. The extremities of these longitudinal shafts are mounted, and turn in loops or sockets, seen at *o, o*, in the fore part of the machine, and at *p, p*, in the hinder part. The loops or sockets *o, o*, are formed at the ends of the swinging levers or arms *q, q*, hanging on joint-pins, inserted into the pendant bracket *g*. This part of the apparatus is shewn, detached, at fig. 7, which represents the pendant-bracket *g*, as seen from behind, with the swinging levers *q, q*, appended thereto; and fig. 8, is a side view of the same. The loops or sockets *p, p*, which support the back ends of the shafts *n, n*, are affixed to the pendant arm *r*, at the back part of the middle longitudinal bar *a*.

In the hinder parts of the shafts *n, n*, are formed cranks at *s, s*, and to the fore parts of these shafts bevil pinions *t, t*, are affixed, taking into the teeth of the bevil-wheels *u, u*, on the shaft *e*, of the running-wheels.

To the cranks *s, s*, are appended connecting-rods *v, v*, which rods are forked, as shewn in fig. 2; and between the fork of the rod *v*, the stem of the vibrating hoe *l*, is inserted, and held in connection therewith by a joint-pin, as shewn in fig. 3.

It will now be perceived, that as the running-wheels *d, d*, with their axle *e*, revolve, the bevil-wheels *u, u*, will cause the pinions *t, t*, to give rotary motion to the shafts *n, n*. The cranks *s, s*, as the shafts *n, n*, revolve, will consequently move to and fro the forked rods *v, v*; and these rods, by means of their connection with the stems of the

hoes *l, l*, will cause these hoes to oscillate laterally upon their joints, as shewn by the dotted lines in fig. 3.

Now, it is these oscillating movements of the vibrating hoes *l, l*, produced by the advance of the machine over the land, which cause the blades of the hoes to cut laterally, at intervals, into the lines of drilled turnips, and thereby to thin the crop in such parts as may be required.

On the vibratory speed, or frequency of the oscillating movements of these hoes *l, l*, will depend the quantity of the turnips hoed up, or the distances apart at which the hoes shall cut into each line; and this may be regulated by changing the speed of the wheels and pinions *u*, and *t*. For general purposes, it is not necessary to remove the pinions *t, t*, from the shafts, and substitute others, but the pinions on the shafts may be brought into gear with the larger or smaller circles of teeth, on the faces of the wheels *u, u*, according to the speed required.

If, from a deficiency in the crop, or from any other cause, it should be found necessary to suspend, occasionally, the action of the cross-cutting or vibratory hoes *l, l*, that may be instantly effected by depressing the thumb-levers *w, w*, close to the handles. To these thumb-levers are attached rods and chains or cords *x, x, x*, passed under and over guide-pullies, and connected at their reverse ends to the bottom parts of the swinging-levers *q, q*, as shewn best in fig. 7. Then, on depressing the thumb-levers *w, w*, the rods and chains or cords *x, x, x*, will draw the swinging-levers outward, as represented by the dotted lines, in fig. 7, and by so doing, draw the pinions *t, t*, on the shafts *n, n*, out of gear with the bevil-wheels *u, u*, and bring them into the position shewn by the dotted lines in fig. 2, thereby suspending the rotations of the shafts, and stopping the action of the hoes.

When the conductor takes his thumbs from the levers

w, w, the springs *y, y*, immediately press the pinions *t, t*, into gear again with the wheels *u, u*, in their original positions, and the hoes *l, l*, are made to vibrate as before.

In figs. 1 and 2, are represented lateral catch-springs *x, x*, attached to the pendant bracket *g*, which springs *x, x*, are for the purpose of catching the teeth of the pinions *t, t*, when they are drawn back, and holding the crank-shafts *n, n*, firmly, so that they may not be allowed to turn, by which means the blades of the vibratory cutters *j, j*, will be kept up on one side of the line of turnips, and consequently be prevented from cutting the crop as the machine passes over it.

By removing the vibratory hoes *l, l*, and their pendant arms *m, m*, and replacing them by fixed spear-pointed cutters, similar to the central hoe *k*, the apparatus may be made to act as a scarifier, for cutting up weeds; and in place of the hoes *l, l*, there may also be substituted, at any time, other forms of blades, having longer cutting surfaces, if required, in order to thin the turnips to a greater extent than can be effected by means of the cutters represented in the figures.

The patentee claims the invention and adaptation of vibratory cutters, to a machine for hoeing turnips and other crops, by reciprocating lateral movements; and the connecting mechanism, by which the said vibratory cutters are made to act through gear, communicating with the running-wheels of the machine; and also the means by which their actions may be occasionally suspended, as stated above.—[*Inrolled at the Petty Bag Office, January, 1842.*]

Specification drawn by Messrs. Newton and Son.

To JOSHUA TAYLOR BEALE, of East Greenwich, in the county of Kent, engineer, for certain improvements in steam-engines.—[Sealed 10th July, 1840.]

THIS invention refers to that peculiar construction of engine commonly termed rotatory, and is especially applicable to the purposes of locomotion on common roads.

In Plate XVII., fig. 1, is an end view, and fig. 2, a longitudinal vertical section of the engine. *A*, is the chamber or reservoir, into which the steam is admitted for working the pistons or slides *B* 1, to 8, as they are alternately brought into a position to be acted upon by its pressure. *C*, is a cam or wiper, one of which is fixed, by pins, into each end of the chamber *A*, on the inside; they are so formed that the pistons or slides, by passing over them, have their outer edges kept in nearly close contact with the inner surfaces of the chamber. *D*, is a drum, keyed to the shaft *L*, having grooves formed in it, through which the pistons or slides traverse when at work. *E*, *E**, are the passages by which steam is admitted into the chamber, and *F*, *F**, are passages for its egress, after its action upon the slides;—the former passages communicate with the steam-pipe *G*, and the latter with the blow-off pipe *I*, through the valves *H*, and *K*. *M*, is a lever, having its fulcrum at *N*, by which the motion may be reversed.

The working of the engine is as follows:—On steam being admitted through the induction passages *E*, *E**, its pressure will be immediately exerted upon the pistons or slides *B*, causing them to proceed forwards in the direction of the arrows. It will be obvious, that from a perpetual flow of steam, of sufficient density, acting upon the slides *B* 1, to 8, on their alternate presentation, a continuous action is kept up. In addition, however, to the cams or wipers

c, for keeping the slides in contact with the internal surface of the chamber, steam, of a higher pressure than the used outside the drum D, is admitted within the drum, by the pipe P, which, pressing against the inner edges of the slides, causes them to follow the internal form of the chamber, in close contact. The slides have metallic packing fitted to them, as shewn, to keep them steam-tight.

To reverse the motion of the engine, the handle on the upper end of the lever M, is drawn outwards, thereby forcing the lower end of the lever inwards, and, by means of the rods Q, changing the positions of the slide-valves H, and K, so as to convert F, F*, into induction passages, and E, E*, into eduction passages.

In the above figures, the improvements are shewn as applied to a stationary engine, and in this case, the engine is supported by standards O, O; but when it is used as a locomotive or marine engine, a bar is fixed to the chamber A, to prevent its turning; and in the case of a locomotive, it is detained by being fitted into a socket, or any convenient part of the framing, at the other end; when applied to marine purposes, that end might be fixed into the lower part of the vessel.

The mode of applying these improvements to a locomotive engine, is shewn in the diagram fig. 3, in which the engine is represented at 1, and the drawing-shaft at 2;—3, is the bar or lever, connected to any part of the framing, for the purpose of preventing the chamber from turning.

Fig. 4, is a vertical section, and fig. 5, an end view of a modification of this engine. A, is the cylinder, in which are formed eight grooved ways B, for as many pistons or slides C 1, to 8, to work in; D, is a part of a somewhat elliptical form, (keyed to the shaft L,) against the edge of which, the pistons or slides C, are made to press, in order to form an abutment for the steam to exert its power, for the

purpose of impelling the elliptical part *D*, forward. The slides *C*, are kept in close contact with the elliptical part *D*, by the admission of steam (of a higher pressure than that let into the centre part of the cylinder) into the spaces *B*, at the outer edges of the slides.

The action of the engine is as follows :—Supposing steam to be admitted through passages, at *E*, *E*^{*}, the slides *C*, being in contact with the elliptical part *D*, the latter would be driven forward in the direction of the arrow, thus giving motion to the shaft *L*. In order to reverse the motion of the elliptical part *D*, a rod, attached to the slide-valve, has to be drawn out, which converts the entrance steam-passages into exit ways, and *vice versa*.

Fig. 6, shews the metallic packing of the elliptical part *D*, whereby it is kept steam-tight; it consists of a piece of metal *m*, let into each end, extending its whole depth; which piece is pressed against the inside of the cylinder *A*, by a small spring, shewn by dots in the figure. Four pieces *n*, are let into the grooves in the end of the pieces *m*; these latter have likewise a small spring pressing against the end plates of the cylinder *A*. There are also pieces of metal placed in recesses cut in that part of each of the pieces *n*, where it is let into each piece *m*, shewn by dots in the figure, which, having a spring at the back of them, are pressed into the space vacated by the pieces *n*, as they were working.

Standards, similar to those shown in the former engine, might be bolted to this, for the purpose of keeping the cylinder ends from springing, by the pressure of the steam.

The boiler part of these engines consists of a long tube, coiled into the form of a cage or box, in which the fire is to be placed. Water is to be pumped in at one end, and the other end being in communication with the engine, the water is exposed to the action of the fire throughout

its entire passage in the tube, and is thus fed into the engine or engines in the shape of steam.

Fig. 7, represents a longitudinal section of the coil tube and its casing; and fig. 8, a front view of the same with the casing removed to render the arrangement evident. *a*, is the casing; *b*, the tube; the lateral parts or members of the coil at the bottom form a number of fire-bars, which are kept apart; as also those at the top, by pins *x*, bolted into the sides of the casing. *c*, is the ash-pit; *d*, represents the part of the coil for feeding the boiler with water, which is, in the first instance, supplied by a hand-pump; as soon, however, as the engine gets started, the feed-pump, attached to the engine, comes into action, and supplies water. There is a branch at *e*, fitted with a cock at *f*, for the purpose of regulating the supply of water to the engine.

In order to bring this part of the arrangement under the eye of the attendant, the branch (which is represented as supplying the excess water into a funnel *g*.) is fixed in any convenient way into the side of the boiler casing; and connected with it is a pipe, for returning the surplus water into the reservoir; or this regulation of the supply might be made self-acting.

m, is the blowing apparatus, consisting of a set of fans, revolving upon a shaft, fixed in a case; *n*, is a throttle-valve, having a lever connected with it at the command of the attendant, to enable him to regulate the draft of the fire. The throttle-valve, and ash-pit doors, are so fitted, that the draft can be almost entirely shut off, when required, so as to damp the fire in a very short time; thus giving the attendant sufficient command over it.

Another part of this invention consists in using, in this and other boilers, water, rendered slightly alkaline, by the addition of lime; for this reason, that by precipitating the free carbonic acid, and the earthy salt (carbonate of lime)

contained in ordinary water, incrustation and "priming" are prevented in a great degree, which in locomotive engine boilers is a very serious detriment, as they are more than others exposed to priming; that is, having much of the water blown out of the boiler with the steam: in such cases, the earthy salts, which are deposited from the water, are of a gritty nature, some of which are blown through the interior of the engines.

When using a boiler made entirely of pipes, a dilute acid, as hydrochloric, or dectic, is occasionally passed through it, to dissolve any deposited lime.

The patentee claims, firstly, the general combination and arrangement of the several parts represented in the drawings, and described in the specification.

Secondly.—The use of a bar, such as that shewn at fig. 3, besides which no framing is required, nor any other support but that derived from the shaft.

Thirdly.—The application of the boiler, where great lightness and economy are desirable, such as in carriages, or for locomotion on common roads, and for which purpose the patentee only claims it.

Fourthly.—The use of lime, as set forth in the specification.—[*Inrolled in the Rolls Chapel Office, January, 1841.*]

To BENJAMIN BEALE, of East Greenwich, Kent, engineer, for his invention of certain improvements in engines to be worked by steam, water, gas, or vapours.—[Sealed 13th July 1841.]

THIS invention relates, firstly, to those peculiar constructions of steam-engines, commonly called or known by the name of rotary engines, in which the power, exerted by

the elastic force of steam or other fluid, is communicated from a central rotary axle; secondly, in an improved mode of applying the power produced by the improved engine or any other engines, to the paddle shaft of steam-boats; and thirdly, to the construction of the boilers by which such or other steam-engines or steam apparatus may be worked.

In Plate XVII., fig. 9, represents an end elevation of one of the improved engines; fig. 10, is a side view of the same; and fig. 11, a transverse section, taken through the middle of the engine. *A, A, A*, is a hollow cylinder, within which a drum wheel revolves excentrically, carrying several cylindrical pistons, which are to be actuated by the power of steam or any other fluid. The steam from the boiler, hereafter described, or from any other suitable boiler, is conducted by a pipe *a*, into the valve box *b*, and thence proceeds by the induction passage *c*, to the interior of the cylinder. The drum-wheel *d*, is fixed upon an axle *e, e*, which passes through two circular apertures in the ends of the cylinder *A*, and is properly supported on stationary bearings *f, f*, and packed in sockets *g, g*, contiguous to the ends of the cylinder, so as to render both ends of it steam-tight. The apertures in the ends of the cylinder, through which the axle *e*, passes, are excentric to the interior of the cylinder, so much so, as to cause one part of the periphery of the drum-wheel *d*, to work against a curved part prepared for it in the interior of the cylinder, and thereby to produce a steam stop; consequently, the steam way within the cylinder is of a crescent form. Longitudinal recesses *i, i, i*, are made in the drum-wheel *d*, for the reception of the loose rollers or cylindrical pistons *h, h, h*. These cylindrical pistons have no axles, but are made perfectly flat at their ends, and of such lengths as will enable them to fit accurately against the internal ends of the cylinder, steam-tight, but yet capable of revolving. The cylindrical pistons

h, are of such diameters as will allow them respectively to pass freely into recesses *i*, and the depths of the recesses are such as to permit the cylindrical pistons to recede within the curve of the periphery of the drum-wheel. There are small grooves in the inner part of the chamber *A*, shewn by dots at *s, s*, in the section fig. 11, leading to the induction and eduction passages, which are designed to prevent the compression and rarification of the steam.

The internal construction of the engine having now been described, its mode of operating will be readily understood, principally by reference to the section, fig. 11.

Steam, of any required pressure, admitted into the engine by the induction passage *c*, will first occupy the small part of the steam-way marked *j*, and insinuate itself into the recess *i*, behind the piston, and it will also force the piston *h*¹, tightly against the opposite side of the recess *i*, and against the internal periphery of the cylinder, forming at those parts steam-tight junctions. The force of the steam thus acting, will cause the drum-wheel *d*, to perform part of a revolution until the piston *h*¹, arrives at the situation of *h*². By this time, a second piston, as *h*³, will have been brought into the situation of the piston *h*¹, and will there be acted upon in like manner, and consequently continue the rotation of the drum wheel. When the piston *h*³, passes the opening of the eduction passage *k*, the volume of steam which had been acting upon it immediately escapes up the passage *k*, through the slide valve *l*, into the eduction pipe *m*, and thence into the atmosphere or to a condenser.

It may be here remarked, as a consequence of this construction of engine, that the drum wheel, in revolving, causes the cylindrical pistons not only to fall by their gravity against the internal periphery of the cylinder, but to be thrown outward by the centrifugal force, and thereby

be kept at all times in contact with the surface of the cylinder, which is further aided by the pressure of the steam acting against the pistons, which are thereby kept steam-tight.

The valve *l*, *l*, and eduction steam-pipe *k*, are covered, as seen in fig. 11, with some material, which is a bad conductor of heat, such as air, saw-dust, felt, wood, asbestos, or other suitable substance. The object of thus clothing this part of the engine, is for the purpose of preventing the eduction steam from carrying off the heat, or reducing the temperature of the induction steam passing from the boiler through the valve-box into the cylinder. For, unless some such precaution is taken, it will be found, that the temperature of the induction steam will become reduced.

In reciprocating engines, both sides of the piston and the internal ends of the cylinder may be similarly clothed for a like purpose.

To reverse the action of the engine, which is often required when employed for locomotive purposes, the screw-shaft *n*, must be turned by means of the handle, and thus the valve will be brought into the position shewn by dots, when the steam will be supplied to the cylinder on the opposite side through the pipe *k*, and make its exit through the pipe *c*, in the contrary direction of the arrows, thus reversing the motion of the engine.

The bosses *g*, *g*, and the bearings *f*, *f*, are constructed in the manner shewn in fig. 1. *e*, represents the main shaft of the engine, surrounded by a sufficient number of small loose rollers without axles, all accurately turned to one size. These rollers are placed nearly in contact completely round the main shaft, and prevented from escaping by end plates, which are properly secured, as seen in fig. 10, and the joint is made perfectly steam-tight, by means of hempen or metallic packing.

The bearings *f, f*, of the engine, are constructed in exactly the same manner, and as the main shaft revolves, it causes the small rollers to revolve also, and be carried round with it, thereby greatly reducing the friction, and preventing the bearings from wearing so fast, as when constructed in the ordinary manner; the wearing surfaces being so much more extended, and thereby offering less resistance.

In order to prevent any straining of the standard or base-framing *B, B*, the working cylinder is not fixed to the base-frame, but held down by a jointed rod *o*, (see fig. 11,) one end of which, being attached to the cylinder, and the other end fixed firmly to the framing, or otherwise secured, keeps the cylinder from turning, and yet allows a slight elastic action, sufficient to prevent any serious strain.

Fig. 12, represents another construction of rotary engine, in which sliding pistons are employed in place of the cylindrical pistons *h*. These slides are forced out and kept in contact with the internal surface of the cylinder, by means of cams or excentrics *p*, and are kept steam-tight by a metallic packing *q, q, q*.

Steam admitted into the cylinder acts upon these pistons, and passes into the eduction-pipe in a similar manner to that described in reference to the other figures. As the pistons or slides wear away by constant use, the cams, held by rods or screw-shafts *r, r*, (see fig. 13,) are brought down on to the inner ends of the lower pistons, by turning these screw-shafts *r*, which act in projecting pieces *t*, attached to the side of each of the cams.

The other parts of this engine are exactly the same as the one above described, and therefore need no further explanation.

The second part of the invention, namely, the novel application to the paddle-shaft of the power produced by any description of steam-engine, consists in the employ-

ment of a comparatively small engine, either reciprocating or rotatory; and instead of fixing the paddles on the engine-shaft, a pinion is fixed thereon, which gears into a large spur-wheel, mounted on the paddle-shaft, altogether distinct from the engine.

Fig. 14, is a diagram, representing the mode of effecting this object. *a, a*, is the cylinder of a reciprocating engine, and *b*, is the crank-shaft, having a pinion *c*, mounted thereon. This pinion gears into a spur-wheel *d*, which is mounted on the paddle-shaft; the air-pump or pumps are also connected to this shaft, although not shewn in the diagram.

The engine being driven at a very great velocity, a sufficient power is thereby obtained to propel the boat by using smaller engines, and thus the weight of machinery and radiation of heat is diminished, and a great saving is effected in the first cost of the engine. When the paddles are not wanted, it will only be necessary to disengage the pinion *c*.

The third feature of the invention relates to the construction of boilers, with tubular flues, in a peculiar manner.

A vertical section of a circular boiler is shewn at fig. 15, and a horizontal section of the same at fig. 16. The fire-place or furnace *a, a*, is surrounded on all sides by a water-chamber *b, b*; and from the upper part of the furnace a series of flues rise, consisting of narrow metal tubing *c, c, c, c*, screwed or otherwise fastened into a strong iron plate *d, d*, which forms the bottom of the boiler. The other ends of the metal tubes are screwed into the upper plate *e, e*, of the boiler, in the following manner:—

Screw-nuts being fastened on the upper ends of the tubes, they are inserted into the holes tapped in the upper plate *e, e*, to receive them, and when placed in their proper position, they are screwed into both bottom and top plate

at one and the same time, by introducing a broach, or other similar instrument, into the upper end of the tube, for the purpose of turning it round, until the tube becomes firmly secured in its proper place.

Figs. 17 and 18, represent another modification of the above,—fig. 17, being a vertical section of a quadrangular boiler, and fig. 18, a horizontal section of the same. This boiler is intended to generate steam of a high pressure, and for this purpose it is made capable of resisting the exertion of considerable internal force. This is effected by firmly bolting together, or otherwise internally securing the top, bottom, and sides, of the said boiler. *g, g, g,* are bolts or rods, passing from side to side of the boiler, securely screwed, at both ends, by nuts, as seen in the drawing. The top and bottom of the boiler are held together by the tubular flues *c, c, c,* which are screwed into the plates forming the same, in a similar way to that described in reference to the former figures.

The upper part of the boiler answers the purpose of a steam-chamber, where the temperature of the steam and water becomes raised by being in contact with the heated surfaces of the tubular flues and bolt-rods. The steam, in passing to the engine, proceeds through the supply-pipe *h, h.*—*b, b,* is a space, (surrounding the furnace,) for the reception of any impurities contained in the water,—it may be cleansed by removing the plugs *i, i.*

The patentee claims, firstly, the adaptation of cylindrical rolling steam-stops or pistons, however they may be adapted to rotatory engines or rotatory pumps, as above shewn and described; secondly, the use of anti-friction rollers, without centre bearings, round the axles of rotary engines, for the purpose of reducing friction; thirdly, the use of the outer bearings *f, f,* when employed for the purpose above shewn and described; fourthly, the introduction of non-conduct-

ing or imperfectly conducting substances between or around the induction or eduction passages or other parts of engines above mentioned, for the purpose of preventing the eduction steam abstracting heat from the induction steam, and thereby economising fuel; fifthly, the method, as above described, of applying the power of alternating or rotatory engines, to propelling steam-boats or other vessels; and sixthly, the improved form and construction of light tubular flue boilers, as herein shewn and described, for steam-boats and other purposes.—[*Inrolled in the Petty Bag Office, January, 1842.*]

Specification drawn by Messrs. Newton and Son.

To EDMUND TAYLER, of King William-street, in the city of London, Gent., for certain improvements in the construction of carriages used on rail-roads.—[Sealed 11th May, 1841.]

THE first part of these improvements consist in forming the panels of railway carriages of sheets of papier-maché, which are attached to the carriage framing in the same manner as the wood panels at present in use, and painted and varnished the same as wood; they are about half the substance of the wooden ones. The roof is also covered with sheets of papier-maché, about one-eighth of an inch in thickness, laid across the roof, and the joints covered with a batten or strip of wood to keep out the wet.

The second part of these improvements comprises a compound axle, and various improvements in wheels, which, from their several methods of construction, are less liable to break than wheels of the ordinary construction.

In Plate XVII., fig. 1, is a longitudinal section of an improved compound axle, having bearings or journals outside

the wheels, upon which the carriage is supported. *a*, is a turned wrought-iron axle, (with a journal or bearing *b*, *b**, at either end.) Upon one end of this axle a wheel *c*, previously bored true, is driven tight against the shoulder, and secured in the usual manner by a steel key, which fits into the groove *d*. The other wheel *c**, is driven firmly on one end of a wrought-iron tube *e*, (half an inch in thickness,) and held in its place by caulking, or upsetting the extreme end of the tube into a recess in the nave. The axle *a*, with the wheel *c*, attached, is passed through the tube, until the end of the tube, and the shoulder of the axle, are in contact; and the axle is then secured by a wrought-iron collar *g*, and the split-pins *h*, *h*, as is fully shewn in fig. 2, which is a section through *y*, *z*, in fig. 1. A wrought-iron collar *f*, is welded on the end of the tube, to prevent the same from bursting, and the middle of the axle is turned one-eighth of an inch less in diameter than the inside of the tube, to prevent any unnecessary friction.

When bearings inside the wheels are required, the tube must have two collars welded on it, immediately behind the wheel *c**, to form the journal *b**; the journal *b*, is turned on the axle *a*, directly behind the wheel *c*.

Fig. 3, is a side view of a portion of an improved railway carriage wheel, and fig. 4, is a portion of a wrought-iron nave and axle for the same. The axle is forged with a swell *i*, into which six holes *j*, *j*, *j*, (the number of the spokes) are accurately drilled, at right angles to the axle. *l*, *l*, *l*, are wrought-iron spokes, which are turned at one end, so as to fit into these holes, and leave a small shoulder; the other ends are also turned and screwed, and an oblong hole or slit cut through the threaded part. *m*, *m*, are hexagonal nuts, with holes drilled through each of their six sides; and *n*, *n*, *n*, are washers, curved on one side, and flat on the other, to give the nuts a true bearing. *o*, is a

wrought-iron ring or hoop, in three parts, and *p, p, p*, are six segments of dry seasoned oak, or other suitable wood, turned true, both on their inner and outer circumferences. *q*, is an ordinary wrought-iron hoop or flanged tire, turned true on the inside, and secured in its place on the wheel by the bolts *s. s.* To put this wheel and axle together, the spokes *l, l, l*, are first driven quite tight in the holes *j, j, j*, until the small shoulders bear true on the nave. The nuts *m, m*, are then screwed on as far as they will go, and the washers *n, n, n*, placed above them, with the curved side outwards; after that, the three portions of the inner ring or hoop *o*, are fitted on the ends of the spokes, with the divisions over alternate washers. Around this hoop the six wooden segments *p, p, p*, are laid, held together by wrought-iron dowels *r*, and around the wheel, thus formed, the tire *q*, is placed. The screw-nuts are now turned, so as to press the iron ring *o*, and wooden segments *p, p, p* tightly against the tire, and render the wheel firm. To prevent the nuts from becoming loose, split keys or pins are passed through them, and through the oblong holes in the spokes.

In place of the wooden segments, segments of papier-maché (one half the depth) may be used.

Instead of the nave being forged in one piece with the axle, it may be cast upon the ends of the spokes, in the manner usually practised by iron-founders, the ends of the spokes being split open, to prevent them from drawing out of the nave. The felloes, instead of being segments of oak, may consist of three concentric hoops of ash or other suitable wood.

Fig. 5, is a side view of a portion of an improved railway carriage-wheel, which has seven spokes, formed of bars of wrought-iron, bent upon a block or shape, into the form of a sector, the sides of which, *t, t*, curve outwards, towards

the spokes next to them. Upon the inner ends of the spokes the nave *u*, is cast, and around the continuous rim, formed by the outer portions of the sectors *v*, six wooden or papier-maché segments, *w, w, w*, are placed, being fastened together by iron dowels *x*; and over the segments a band of thin sheet-iron *y*, is fixed. Upon this band the tire *z*, is shrunk, by first heating the tire, and then placing both it and the wheel in water, which will prevent the wheel from being injured.

The tire, instead of being shrunk on, may be applied cold; and in that case, the wooden segments are backed, and compressed about twenty per cent; then the whole being placed in water, the compressed wood swells to its original dimensions, and holds the tire tightly in its place.

Fig. 6, is a side view of a portion of another railway carriage-wheel, the spokes of which differ in form from those shewn in fig. 5, and have two bends in them; and into the spaces formed by the portions 1, (their sides not being in contact,) wedges 2, are driven, being secured, in those spaces, by the nuts and washers 3.

Various modifications in the forms of the spokes are described.

The patentee claims, First,—The use of papier-maché in the construction of railway carriages.

Second.—The mode of constructing railway carriages.

Third.—The mode of covering the roofs of railway carriages.

Fourth.—The methods of constructing axles for railway carriages.

Fifth.—The method of constructing wheels for railway carriages, with a sub-divided inner ring, for the support of wooden or papier-maché felloes.

Sixth.—Forming the naves and axles of wheels for railway carriages of wrought-iron, in one piece.

Seventh.—The method of forming the naves and axles of wheels for railway carriages, in one piece.

Eighth.—The method of forming the naves of wheels for railway carriages of wrought-iron.

Ninth.—The use of bended hoops or rings of wood, in the construction of wheels for railway carriages.

Tenth.—The use of papier-maché, in the construction of wheels for railway carriages.

Eleventh.—The use of compressed wood, for forming the felloes and spokes of wheels for railway carriages..

Twelfth.—The method of forming the felloes and spokes of wheels for railway carriages of compressed wood.

Thirteenth.—The use of wedges of wood or papier-maché, in the construction of wheels for railway carriages.

Fourteenth.—The methods of constructing wheels for railway carriages, with felloes of wood or papier-maché.

Fifteenth.—Curving, towards each other, bars of wrought-iron, in order to compound spokes for wheels for railway carriages.

Sixteenth.—The methods of constructing wheels for railway carriages with compound spokes, which curve towards each other.

Seventeenth.—The method of constructing wheels for railway carriages, with spokes formed of bars of wrought-iron, having two bends in each bar, with small spaces between such bends.—[*Inrolled in the Petty Bag Office, November, 1841.*]

To WILLIAM FREEMAN, of Millbank-street, in the county of Middlesex, stone merchant, for certain improvements in paving or covering roads and other ways or surfaces,—being a communication.—[Sealed 7th September, 1841.]

THIS invention relates to a mode of paving or covering roads and other ways or surfaces, usually paved; and also the tops and surfaces of walls, by the application of India-rubber, (caoutchouc,) combined with other matters, as hereafter described.

India-rubber (cut into small pieces) is placed in an iron cylinder, having a strong axis passing through it, with teeth projecting therefrom; and by the revolving of this axis, the India-rubber becomes reduced to a strong pasty state, and, when in this condition, a quantity of charred saw-dust is gradually ground in and made to combine with the India-rubber. The saw-dust is charred by moving on a hot plate, or by using a heated vessel, such as is used in roasting coffee, or by other convenient means; such charring only being carried to a very moderate extent. This process of grinding and mixing is carried on until the mass will not take up more of the charred saw-dust. The compound is then taken out from the case and put into iron moulds, of the size desired, and submitted to pressure, in a similar manner to that now pursued for obtaining blocks of India-rubber for manufacturing purposes; but in submitting the compound to pressure, a quantity of strong rough sand is applied in the mould to that surface of the block which is to come to the upper or outer surface of the paved road or way.

The blocks or slabs, so formed, are allowed to remain under pressure, in the moulds, till the materials are cold; they are then taken out and piled away for use.

The blocks, when used for paving, are caused to adhere one to another, by using India-rubber cement; and although saw-dust is preferred to be used, in compounding blocks with India-rubber, yet the same may be dispensed with, and sand or finely broken stone may be used in lieu thereof.

The patentee claims the mode of paving or covering roads or other ways or surfaces, requiring to be paved or covered, by applying India-rubber, (caoutchouc,) combined with saw-dust, sand, or finely-broken stone, and pressed into blocks or slabs, as described.—[*Enrolled in the Enrolment Office, March, 1841.*]

To ANTOINE JEAN FRANÇOIS CLAUDET, of High Holborn, in the county of Middlesex, glass merchant, for certain improvements in the process or means of an apparatus for obtaining images or representations of nature or art.—[Sealed 18th December, 1841.]

THESE improvements apply to the process of obtaining images from objects on the principle called Daguerreotype, and may be divided into five parts, consisting, firstly, of a camera-obscura, constructed in such a manner, that the lenses can be changed, and any particular optical arrangement adapted to the camera, to render it applicable to object-glasses of various foci, which will enable the operator to work, either upon large or small plates, and obtain the representation of near or distant objects.

By the second part of the improvements, operations, which heretofore required two distinct processes, may now be conducted simultaneously in one. This is effected by applying, within the camera-obscura, the vapours of mercury, at the same moment that the light is producing its

effect upon the plate. By this arrangement the process is simplified, the apparatus is less bulky, the separate mercury-box being entirely suppressed, and two important advantages are obtained, viz. : that when the mercury acts simultaneously with the light, the effect is more intense and more perfect, and that the operator being able, by the construction of the apparatus, to watch the process, (as will be hereafter explained,) he can judge when the image has attained its full effect, and therefore there is no danger of having pictures either too dark or too faint.

The third feature of the improvements consists in applying to portraits, taken by the Daguerreotype process, painted back grounds or scenes representing objects, which, by the various distances of their parts, could not otherwise be correctly introduced in a Daguerreotype portrait, on account of the different foci of the several objects combined.

The fourth feature of the invention consists in the employment of a certain artificial light in taking portraits, at night or in the day, in apartments or other situations, where natural light is not sufficiently strong. This artificial light is produced, first, by the combustion of coal, promoted by a jet of oxygen gas ; second, by the flame of combustible gases, and carburetted liquids, burning together with oxygen ; third, by a solid refractory body, suspended in a jet of inflammable gas, which is burnt together with oxygen, or in a jet of oxygen gas, charged with the vapour of sulphuric ether.

The fifth and last of the improvements consists in performing all the operations upon the plates (which were formerly carried on in the dark) in a room lighted through media of various colours, such as red, orange, green, and yellow, but red is preferred, as it, having very little effect upon the plates covered with the sensitive coating, allows the operator to see how to perform the work, without being obliged, as before, to remain in a dark room.

The following is a detailed explanation of the several heads above mentioned :—

First.—The improved construction of the camera-obscura consists in affording the means of applying thereto several optical arrangements, either consisting of single or compound object-glasses, of any convenient aperture or size, and any focal distances, either alone or combined with reflectors or prisms; by which means, the Daguerreotype apparatus is rendered more portable, less complicated, and less expensive for those operators who wish to take pictures or representations of different sizes, and which could not be done conveniently if they were obliged to comprehend, in their Daguerreotype apparatus, as many cameras as would otherwise be required for each different optical arrangement.

This improvement is effected by giving to the front of each camera-obscura, contained in a Daguerreotype apparatus, a sufficiently large aperture to admit the largest object-glass intended to be used. Each optical arrangement is fixed upon a board, of a given size, so that by means of slides, in the open front of the camera, it is easy to substitute one for another in the same camera-obscura.

The distance at which the sensitive plate is to be placed, for the focus of each optical arrangement, is to be regulated by a rack and pinion, or other suitable means, for sliding the frame, in which the plate is fixed, to and fro, in the axis of the lens. The frame, holding the plate, should also have the means of sliding vertically, which may be done by a sliding tube, like a telescope, furnished with a thumb-screw, to fix it at the proper height.

One of the greatest difficulties in the Daguerreotype process, as heretofore carried on, is the impossibility of ascertaining the precise moment at which the light has produced, on the prepared plate, the effect required to enable

the vapours of mercury to bring out the image. The intensity of light, which varies according to the time of the day, and the state of the atmosphere, and the impossibility of preparing plates, having exactly the same chemical sensitiveness, has compelled the Daguerreotypist hitherto to operate at random, with regard to the time required for the exposition of the plate to the action of the light in the camera-obscura, so that the image, when ultimately brought out by mercury, is almost always either too dark or too faint.

As there are no means of ascertaining when the light has sufficiently operated on the plate, which exhibits no visible mark of the effect, the process is rendered very difficult and uncertain; but applying the vapour of mercury to the plate, while the surface is being acted upon by the light, enables the operator to see the progress of the picture. Another advantage is, that the effects of the mercury, upon those parts of the plate which have been operated upon by the light, are more perfect when caused to take place immediately under the influence of light.

The alterations made in the construction of the apparatus employed in the Daguerreotype process, are the following:—

In place of the detached mercury-box, a cup, containing mercury, is placed in the camera-obscura, and, by means of a spirit lamp, the vapour of mercury is caused to rise and fill the camera. When the mercury has attained the proper temperature, the aperture of the object-glass is opened, and the operation commences.

Now, in order to watch the effect, an opening is made in the side of the camera, through which the operator can see the image on the plate within, which is to be lighted by a lantern throwing the light upon the plate, through an aperture in the side of the camera, in which is placed a piece of

red or orange-coloured glass. As soon as the simultaneous effect of light and mercury has operated sufficiently to bring out the image, the object-glass is shut, and the plate, which shews the image, in all its perfections, is removed, requiring only the washing process to be quite finished.

The third part of the invention applies to taking portraits, and consists in placing, behind the sitter, back grounds of painted scenery, representing landscapes, interiors of apartments, and other representations, adapted to the taste and habits of the sitter, or to his profession. The advantages of these back-ground scenes are obvious, for they give to the portrait an effect quite pictorial; besides, the sitter can be placed according to the colour of his dress, complexion, or hair, either against a dark or a light part of the subject, painted upon the back-ground scene.

The combination of scenery may be varied, by shifting several back grounds one upon the other, like theatrical decorations, and by placing, nearly on the same plane with the sitter, such subjects as could not be correctly introduced in a Daguerreotype portrait, as the Daguerreotype process does not represent the correct images of any objects but those placed nearly at the same focus.

With reference to the fourth head of the invention, the employment of artificial light in the absence of day-light, it is to be observed, that whichever of the three modes of illumination, above described, be employed, a reflecting mirror, of a concave form, must be adapted behind the light; and an essential feature of this invention is, that the burner or burners, or the alimentary tube, which conveys the combustible gas for supporting combustion, must be placed in the axis of the reflecting mirror, or such tubes must be placed round it, parallel to the axis of the mirror, in such manner, that their jets (falling upon the body of coal or refractory material, held in front by means of a

platina or iron wire, by which it is attached to the burner), shall illuminate its surface precisely opposite the centre of the curve. It must be the same also with regard to the flame produced from carburetted gas burning with oxygen. This flame must issue forth from a tube, placed in the axis of the reflector.

The illuminating flames are sometimes produced by means of carburetted gases, obtained from sea-coal, and from fatty substances, made to pass through a vessel containing an essential oil of a highly volatile nature, and which vessel stands in water constantly boiling. By these means the essential oil will be mixed with the burning gas, so that at the moment of its combustion with the oxygen, it produces a most brilliant light.

In the case of carburetted liquids being employed, the burner is constructed of tubes, placed side by side, each fixed in the centre of a wick, the end being plunged into an essential oil, mixed in equal portions with spirits of wine or naphtha.

The patentee claims the improvements in the process or means of an apparatus for obtaining images or representations of nature or art, as set out under the five heads above recited, and more fully explained in the subsequent parts of this specification.—[*Inrolled in the Petty Bag Office, June, 1842.*]

Specification drawn by Messrs. Newton and Son.

To GEORGE BARNETT, of 39, Jewin-street, in the city of London, tailor, for improvements in fastenings for wearing apparel.—[Sealed 11th July, 1840.]

THE first part of these improvements consists in a peculiar construction of spring hooks, drawings of which are shewn

in Plate XVII.,—fig. 1, being a plan, and fig. 2, a side view.

The spring is made of a plate of steel, which is punched into the shape shewn in fig. 3, by a fly press, and is then bent in the manner shewn in the side view, fig. 2. *a, a*, are the hooks, passing through two openings *b, b*, in the plate, when in use, and when out of use, remaining beneath the upper part of that plate, which thus serves as a shield to them.

The thread for securing the hooks passes through the holes *c*, which are exactly under the opening *d*, (in order that the needle may have easy access to them,) when the plate is bent.

Figs. 4, and 5, shew a plan and side view of a modification of the above, in which it will be seen that the hooks *a, a*, embrace the edge of the plate, instead of passing through openings in it.

The second improvement consists in an instrument for retaining a button on garments, in those cases where the shank of the button is passed through an eyelet-hole.

It is formed by bending wire into the shape represented in figs. 6, 7, and 8, consisting of a frame *f*, enclosing a tongue *e*, which is passed through the shank of the button.

The third improvement relates to the hooks generally used for fastening ladies' dresses, and consists in making an indentation *g*, figs. 9, and 10, in the hook, to prevent its being accidentally released from the eye.

A brace-button, of a novel construction, constitutes the fourth improvement.

Fig. 11, is a view of the under-side; fig. 12, a view of the upper-side; and fig. 13, a section of the improved button, which consists of two discs *h*, and *i*, pierced with four holes *j*, (shewn separately in the sections, figs. 14, and 15.) The edge of the disc *h*, and the edges of its holes are raised, as

seen in fig. 14, and the latter passing through the holes in the disc *l*, are pressed down, together with the edge of the disc *h*, by dies, which complete the formation of the button, as shewn in figs. 11, 12, and 13.

Instead of the above mode, the holes in both discs may have their edges raised, and afterwards slightly flattened, as represented in the sections figs. 16, and 17; the discs are then combined in the manner shewn in fig. 18.

The object of manufacturing buttons in the manner described, is to prevent the edges of the holes from cutting the thread by which the button is attached to the garment.

The fifth improvement consists in a buckle, the tongue of which acts by pressure. Fig. 19, is a plan, and fig. 20, a side view of the buckle; figs. 21, 22, and 23, are separate views of the tongue and frame of the same. *k*, is the tongue, (which may be notched or plain,) mounted upon a frame *l*, turning on a spindle that passes through the part *m*, of the frame, to which part also the strap *n*, is attached; the other end of the strap is secured by being inserted between the edge of the tongue and the frame *m*, and then passing over the part *n*, and under the hind end *o*, of the tongue.

The sixth improvement has reference to the straps applied to waistcoats, and the waistbands of trousers, for the purpose of tightening them by lacing, and is shewn in the side view, fig. 24. It consists in connecting those straps by a centre-piece *p*.

The seventh improvement consists in a means of fastening trousers-straps, and is shewn in figs. 25 and 26. To one of the straps a button *q*, (shewn separately in fig. 27,) is riveted, having on the top of it a projection *s*, the sides of which are grooved, and receive the edges of the sliding-plate *t*; in the other strap, a circular hole *r*, is formed. To fasten the straps, the plate *t*, is slid forward, as

seen in fig. 26, and is, with the projection *s*, passed through the opening *r*, in the other strap; the plate *t*, being now moved into the position shewn in fig. 25, the straps are fastened.

Instead of the projection *s*, having grooves in its sides to receive the edges of the plate *t*, it may be enlarged, and an opening *u*, made in it for the plate to pass through, as represented in fig. 28.

The patentee claims, firstly, the mode, herein described, of constructing hooks with shields.

Secondly.—The mode of constructing instruments for securing buttons on garments.

Thirdly.—The mode of forming hooks, with the part *g*, as described.

Fourthly.—The mode of forming brace-buttons, with holes made, as herein described.

Fifthly.—In the improved buckle, the mode of constructing and combining a frame *l*, and framed lever tongue *k*.

Sixthly.—The mode of applying the centre-piece *p*, to connect the waistbands of trousers and waistcoats.

Seventhly.—The mode of connecting trousers-straps, herein described.—[*Inrolled in the Inrolment Office, January, 1841.*]

To OGLETHORPE WAKELIN BARRATT, of Birmingham, metal gilder, for certain improvements in the precipitation or deposition of metals.—[Sealed 8th September, 1841.]

THESE improvements in the precipitation or deposition of metals, consist, first, in the application of electric currents, for the purpose of depositing copper and its alloys, taken into solution in the acids employed during the process of cleaning such metals.

For this purpose, a saturated solution of copper, in the mixed acid, known as dipping aqua-fortis, by the trade, is put into a vessel, the edge of which is connected by two copper wires with a battery, in the usual way. The work to be cleaned is attached to the wire, in connection with the copper or negative metal of the battery, and a plate of copper, of a larger area than the area of the surface of the work to be cleaned, is suspended from the other wire. In from five to ten minutes, the scale or oxide of copper on the surface, will be removed, and then another article may be introduced and cleaned.

If the surfaces of the articles to be cleaned are required to be bright, an addition of free acid is made to the saturated solution, in the proportion of one part acid to ten of solution; or if the surfaces are desired to have a dead appearance, muriatic acid is added, in the proportion of one to two parts acid to twelve of the solution.

Secondly.—This invention consists in a mode of precipitating zinc upon other metals, from its solution, by the application of electric currents.

A solution is made of metallic zinc, by dissolving it in diluted sulphuric acid, and in this solution the articles to be coated are immersed, together with a plate of zinc, somewhat less in surface than those articles; the former being connected with the positive plate of the battery, and the latter with the negative plate. The articles remain in the solution until a coating of zinc, of the required thickness, has been deposited on them.

Other acid and saline solutions of zinc may be employed, but the above has been found to succeed exceedingly well.

Thirdly.—This invention consists in a mode of precipitating copper upon iron and other metals. The improvements under this head are twofold:—The first consists in connecting the articles to be coated, with a plate of zinc,

by means of a copper wire, and immersing them in a saturated solution of sulphate of copper, containing about four or five per cent. of free sulphuric acid. The patentee prefers to enclose the zinc plate in a wrapper of cloth or strong paper, to prevent the deposition of the copper upon it.

The second improvement relates to the employment of solutions of the oxides of copper, instead of the acid solutions heretofore employed. These solutions are more particularly applicable to the coating of iron, or other metals, which are preserved, in a negative state, with difficulty, in the acid solutions.

Eight pounds of cyanuret of potassium, two pounds of cyanuret of copper, (or instead of the latter, two pounds and a half of sulphate of copper,) and three gallons of water, are introduced into a copper vessel, or a vessel having copper plates in it, and boiled together for three or four hours.—The copper plates, or copper vessel, are now connected by a wire to the negative plate of a battery, and the articles to be coated are connected to the positive plate of the battery, and immersed in the boiling solution; the deposition of the copper commences immediately, and may be continued till the desired thickness is obtained. Other preparations of copper may be dissolved in the cyanurets of potassium or sodium, and employed for the purpose above mentioned; and carbonates of potassium or sodium may be used in place of cyanurets. The solution may be used at different temperatures, but the action is most rapid when boiling.

If iron articles are required to have a surface of brass, the patentee deposits zinc upon the copper surfaces, obtained as above described, and afterwards submits the articles to a heat of about 300° Fahr., in a muffle or other convenient apparatus.

Fourthly.—This invention relates to a mode of precipit-

ating platinum from its solutions, as a covering to other metals.

One mode of effecting this, is to take a solution of platinum, (free acid being present,) and immerse the article to be coated therein, it having been previously connected with a zinc plate, as before described.

The following is another mode:—Twelve parts, by weight, of muriate of soda, two parts alum, and one part cream of tartar, are added to as much water as will dissolve them; and in this solution metallic platinum is boiled, for eight or ten hours, water being added to keep the salts in solution, as evaporation renders it needful. Copper, iron, and other metallic articles, introduced into the solution when boiling, are speedily coated; but if a stronger coating is required, then the battery and an anode of platinum is applied, and the action continued, until the desired thickness is obtained; or palladium may be employed instead of platinum.

The fifth part of this invention consists in a mode of precipitating copper from the waste water of copper mines, and other waters containing copper.

Pits are formed to hold the solution of waste copper or other metal, and in the solution, a porous earthenware vessel is placed, or the pit is divided by any porous material. Into the porous vessel, or divided pit, is put a solution of muriate of soda, and in this the iron, usually employed for precipitating the copper, is placed, and connected by wires with sheets of copper, lead, or other metal, in the solution of copper. These sheets are to receive the deposit of pure metal; and the solution, after all the copper is precipitated, will serve to dissolve the iron in the porous cell, instead of the muriate of soda.

The sixth part of this invention consists of a mode of
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precipitating gold, silver, or platinum, or other metals, by employing the sulphuret of gold, silver, or platinum.

The gold, silver, or platinum, is dissolved in hydrate of potash, by boiling, and the articles being immersed in it, when in a boiling state, are in a short time coated; if a thicker coating is wanted, it may be obtained by connecting the articles in the above solution with a galvanic or other battery, and by using a gold, silver, or platinum anode.

The seventh and last part of this invention, consists in a mode of precipitating alloys of metals, when in solution, on the articles of metal, immersed in such solution; this is accomplished by taking sulphurets of the metals, in the proportions it is proposed to use them in alloy, and dissolving them in cyanuret of potassium; the operation is then proceeded with in the manner just described, (when using a galvanic or other battery,) with respect to gold, silver, or platinum, using an alloyed anode, agreeing with the proportions contained in the solution.

The patentee claims, firstly, the mode of cleaning copper and its alloys, by means of a galvanic or other battery; and also recovering, by precipitation, the metal dissolved during the process.

Secondly.—The mode of obtaining a coating of zinc or other metals, by precipitating zinc from solutions, by means of a galvanic or other battery.

Thirdly.—The mode of precipitating copper from solutions, by connecting the articles to be coated with copper to a piece or pieces of zinc, as described, and dipping them in the solution of copper used. Also, the mode of coating articles of metal, by causing copper to be precipitated, by a galvanic or other battery, from solutions of copper in the cyanides and carbonates of potash and soda. Likewise, the mode of producing a coating of brass, by precipitating copper and zinc, by means of a galvanic or other battery,

from solutions thereof, and then applying heat, as above explained.

Fourthly.—The mode of precipitating platinum from a solution of that metal, having free acid present, by means of zinc, or other positive metal, introduced into the solution. And also, the mode of precipitating platinum or palladium from the salt solution, above described, by the aid of a galvanic or other battery.

Fifthly.—The mode of precipitating copper from the waters containing copper in solution, as above described.

Sixthly.—The mode of precipitating gold, silver, and platinum, on other metals, by employing the sulphuret of gold, silver, or platinum, when dissolved in hydrate of potash, with or without the aid of a galvanic or other battery.

Seventhly.—The mode of precipitating metals in the state of alloy, by obtaining them in solution, and using an alloyed metal of the same proportion as is in solution.—
[*Inrolled in the Petty Bag Office, March, 1842.*]

DESCRIPTIONS OF PATENTS GRANTED IN 1834, WHICH
HAVE NOT BEEN REPORTED IN THIS JOURNAL.

(Continued from page 375, Vol. XX.)

To HENRY SHARPNEL, of Salisbury, in the county of Wilts, Major-General in the Army, and Colonel in the Royal Artillery, for improvements in fire-arms of various descriptions, and in ammunition for the purposes of fire-arms.—[Sealed 6th September, 1834.]

THE first improvement relates to the sights of muskets, and is for the purpose of enabling persons using them, to point, with greater certainty, at a distant object.

In Plate XVIII., fig. 1, is a side view of a musket, with this improvement applied to it. *a*, is the fixed sight, and *b*, a moveable sight, which is caused to slide up and down the groove in

the graduated plate *c*, by turning the screw *d*; the sight *b*, is moved higher or lower, according to the distance of the object, and the aim is taken by bringing the barrel into such a position, that a line drawn from the sight *b*, will intersect the fixed sight, and the object fired at.

The second improvement is shewn in fig. 2, and consists in the application, to fowling-pieces and other guns, of a prop *e*, turning on a hinge *f*, at one end, and having, at its other end, a spring-catch, (not shewn in the drawing attached to the specification,) which catches into the lower end of the bracket *g*, so that the person firing the gun may use it either in a vertical or horizontal position, grasping it with the left hand, instead of placing that hand under the fore part of the stock, as usual. The object of this improvement, is to keep the hand, that supports the gun, as far from the lock and barrel as possible, to avoid accidents, in case of the barrel bursting, or the lock being blown off.

The third improvement is also shewn in fig. 2, and relates to the stocks of guns. It consists in constructing the stocks with a circular hinge or joint *h*, from one part of which the rack or screw-plate *i*, projects, and is acted on by turning the screw *j*, in order to produce any required degree of bend in the stock, and so suit the same gun to a variety of persons.

The fourth improvement is shewn in fig. 3, which is a longitudinal section of a gun barrel. It consists in contracting the bore of the barrel above the part that receives the powder, as shewn at *k*, *l*, so that the ball cannot approach nearer the powder than the distance from *k*, to *l*, the space between them being filled with air; by which means, says the patentee, a much greater effect will be produced, than by guns of the ordinary construction of barrel.

The fifth improvement consists in constructing the steel or anvil of muskets, against which the flint strikes, with projecting sides, standing at right angles to the face of the steel, to prevent the sparks from spreading laterally, and thus guide them downwards into the pan.

The sixth improvement is shewn in fig. 4, and consists in a lock for discharging by detonating balls. The detonating balls are contained in the tube or magazine *m*, covered at its upper end, and supported by the bracket *n*, screwed on the lock-plate *o*. These balls fall, one at a time, into the hole in the plate *p*, as shewn by dotted lines, when they are permitted to do so by the hole coming under the lower end of the magazine *m*. The plate *p*, slides between two plates *q*, *q*, and is connected by the link *r*, with the hammer, so as to partake of its movements.

Thus, by cocking the hammer, the plate *p*, will be drawn over a recess *s*, (shewn by dotted lines,) near the touch-hole, and drop the detonating ball into it; then when the trigger is pulled, the

plate *p*, will, by the falling of the hammer, be slidden backwards, and the hole in it, coming under the end of the magazine *m*, will receive another ball.

The seventh improvement consists in the application to pistols of a similar prop to that described in the second improvement, as applied to fowling-pieces, &c.; the object, in this instance, being, that the pistol may be held by grasping the prop, and thereby enable the person using it to ward off the cut of a sword.

The eighth improvement consists in forming parallel grooves within rifle barrels, so as to obtain more correct firing.

The ninth improvement consists in having two or more touch-holes, in order more effectually to ensure the ignition of the charge.

The tenth and last improvement consists in the use of hollow shot, filled with small shot, the interstices between the latter, being occupied by small pieces of tin or other metal, and the outer shell of the hollow shot is made so thin as to give way when it comes in contact with any body, and thus distribute the small shot in all directions.—[*Inrolled in the Inrolment Office, March, 1835.*]

To EDWARD WEEKS, of the King's-road, Chelsea, in the county of Middlesex, horticultural builder, for certain improvements on kitchen or other grates or ranges, which he denominates "Weeks' cooking apparatus."—[Sealed 20th September, 1834.]

IN Plate XVIII., fig. 1, is a front view of a kitchen range, constructed to keep a constant supply of hot water for cooking, &c.

The front bars *a, a*, of the grate, are hollow, communicating with the hollow cheeks *b, b*, the backs of which are connected, by pipes, with the bottoms of two cisterns *c, c*, on the hobs of the grate, and these cisterns communicate with each other by three or four pipes *d, d*. The back of the grate *e*, is composed of hollow tubes, and fits into hollow end-pieces, from each of which a pipe communicates with the hot water cisterns *c, c*. In order to guard against the pipes being ever wholly emptied, the cock, for drawing the water off, is fixed near the top of the cheek. *g*, is the smoke-board, which slides up and down in grooves, fixed on the jambs at each side, being hung in the manner of a window by ropes and weights, passing behind the jambs.

Fig. 2, represents, in section, a range of the same construction, with the addition of an oven, placed over the fire, in which a continual current of hot air is introduced, so that meat baked in it will equal that which is roasted. *h*, is the oven, which, by having a double case all round, except at the door-way, a current of hot air can be passed around it. The air enters the inner

case of the oven at the openings *i*, and passes out at the back, together with the exhalations from the meat, through a flue into the chimney. Beside this, another flue *j*, leads from the outer case of the oven into the chimney. *k*, is the opening into the chimney for the smoke from the fire-place, when the oven is not required to be heated; *l*, the pipe that connects the bottom of the cistern to the bottom of the back of the grate; and *m*, the pipe that passes from the bottom of the cistern to the back of the cheek.

Fig. 3, represents a kitchen range, for a house where much cooking is required. The fire-place is formed of hollow tubes, communicating with cisterns *n*, *n*, at each side of it, by means of pipes *o*; and from these cisterns boiling water may be conveyed to other parts of the house. At the back of the range is an oven *p*, constructed in a similar manner to that described in fig. 2; and over the fire-place, in the space between the two cisterns, is a cast-iron plate *q*, on which saucepans and other culinary utensils are placed, for the purpose of boiling their contents. Several longitudinal and transverse slots are formed in this plate, to allow for its expansion when hot, and its contraction, if cold water should be spilt upon it; the escape of smoke, through the slots, being prevented by the insertion of small pieces of iron into them. Tin cooking vessels *r*, of various sizes, are placed in the cisterns *n*, *n*, being supported by frames, which slide along grooves in the sides of the cisterns.

The patentee claims, firstly, the circulation of hot water in pipes or tubes, when forming the bars and other parts of kitchen and other ranges or grates, for the purposes of cooking, and for warming rooms.

Secondly,—The manner of introducing currents of pure air into the oven. He does not claim the circulation of hot water generally for heating rooms and buildings, but only when in combination with kitchen and other grates or ranges, as described.—[*Inrolled in the Inrolment Office, March, 1835.*]

To JAMES JAMIESON CORDES, of *Idol-lane*, in the city of London, merchant, for a certain improvement or improvements in machinery for making nails,—being a communication.—[Sealed 8th October, 1834.]

Fig. 1, is a plan of the chief operative parts of the machinery; fig. 2, is a section, taken on the line *A, B*, in fig. 1, and figs. 3, and 4, are views of some other parts of the machine.

The principal parts of the machinery rest upon a frame, composed of two cheeks or upright sides of cast-iron, firmly bolted together; and in an opening in the front part of the cheeks two

moveable caps or castings *a, a*, fig. 3, are placed. The upper cap is supported by four screws *b, b*, passing through it, and resting on the lower cap; by turning these screws, the distance of the caps from each other is regulated: the lower cap rests upon a wedge or key *c*, for the purpose of adjusting its weight with respect to the other parts of the machinery. Each cap has a shaft or spindle *d*, carrying at one extremity a toothed wheel *e*, and near the other extremity, one of a pair of compressing rollers *f*.

The compressing rollers are made of steel or other hard metal, and are screwed to shoulders on the shafts *d*, to facilitate their removal; they are employed to shape the nail, which is compressed between them, and their circumferences are divided into the same number of equal excentric segments, the degree of excentricity depending upon the shape of the nail required. They are placed near the middle of the caps *a*, one above the other, in such a manner, that when motion is given to them by means of the toothed wheels *e*, similar diameters of each roller come at the same instant into the direction of the line joining the centres. The length of the nail will be the same as that of each excentric segment of the rollers, and its thickness will correspond with the width of the rollers.

The toothed wheels *e*, called by the patentee "retarding wheels," consist of as many excentric segments as the compressing rollers, so that the pitch line of their teeth is not concentric with the centre of motion. They are fastened to flat plates upon the spindles *d*, by screws, which pass through slots in them, in order that the wheels may be so adjusted that their longest radius will be opposite the longest radius of the compressing rollers.

Motion is communicated to the wheels by a pair of racks, one at each side of the machine, the teeth of which are so arranged that the motion of the compressing rollers will gradually decrease from the head to the point of the nail, for the reason hereinafter-mentioned. *g*, is a clasp or head-piece, resting upon projections of the framing of the machine, and in it two sliding levers *h, h*, are secured by screws *i, i*, one of which passes through each of the sliding levers respectively, and presses the other against a pin *j*, passing vertically through the head-piece. To the sliding levers *h, h*, two "guiding slides" *k, k*, or flat pieces with square edges, are bolted, being placed opposite each other, one on each side of the compressing rollers, which work between them; these guiding slides confine the rod, (from which the nails are to be made,) laterally, while the compressing rollers are shaping the nail.

l, l, are two "stretching holders" screwed to the sliding levers *h, h*, immediately behind the guiding slides, and the edges of these stretching holders are made to project in a slight degree, and may

be indented if preferred; so that when the sliding levers close upon the nail, the stretching holders may hold the extremity of it, and keep the nail straight as it passes from under the compressing rollers.

Two "heading-holders" *m, m*, are also bolted to the sliding levers, opposite each other, having their faces slightly grooved; they are intended to hold the nail firmly while it is headed. *n, n*, fig. 4, are two holding bars, situated just behind the compressing rollers, and connected together by two springs *o*, (one only is shewn in the drawing,) the ends of the bars working in grooves at each side of the frame. At the centre of each bar *n*, projecting holders *p*, receive the nail from the stretching holders *l, l*, and hold it until it is carried away by the heading-holders *m, m*.

In fig. 1, *q*, is a heading-frame, carrying a steel heading-punch *r*, and supporting the small ends of the sliding levers *h, h*, which pass freely through it, the frame itself resting on projections of the frame of the machine, and being placed in such a manner, that the centre of the heading-punch may be brought up directly to the centre of the heading-holders. Two levers or toggles *s, s*, are placed within the heading-frame *q*, for the purpose of forming toggle-joints, to close the sliding levers; the toggles pressing at one end against pins *t, t*, which pass through the heading-frame, and at the other end against semi-circular projections of the sliding levers.

A pair of steel shears or chisels *v, v*, are placed between the stretching-holders and heading-holders, being bolted to a pair of shear levers *w, w*, and adjusted by screws *x, x*, so that in their closest position, their cutting edges will pass each other sufficiently to cut off the nails. Motion is communicated to the shear-levers by means of arms and cranks from a racking-shaft. A small piece of iron, called a striker *y*, is screwed in front of the upper shear-lever, and descends as the shears close, for the purpose of striking down the finished nail, in case its own weight should not disengage it from the remainder of the rod, when it is released by the heading holders.

The following is the mode of operation:—The rod intended to be made into nails is heated, and the end of it is led through a tube *u*, to the compressing rollers *f, f*, and being caught by their edges, is drawn in between them; in its passage it is compressed into the form of a nail, by the excentric segments, the point being formed by the near approach of the longest radii of the rollers. As soon as the end of the rod has passed the centres of the compressing rollers, the sliding levers *h, h*, begin to move from the rollers in the direction of the arrows, and at the same time they are closed by the action of the toggle-joints. The guiding slides *k, k*, are thus brought close to the sides of the nail, and keep it from spreading laterally; and at the same time the projecting

edges of the stretching rollers *l, l*, clasp it at a short distance from its foremost end, and, moving forward with it between them, pass it between the holders *p, p*, of the holding bars *n, n*, the springs *o*, of the bars allowing them to separate for that purpose. The continually-increasing pressure of the compressing rollers upon the rod, from the neck to the point of the nail, lengthens it, and would cause the nail to turn or crook between the rollers and the stretching holders, if their relative motions continued unaltered; but the motion of the rollers being retarded, as explained in the description of the toothed wheels *e*, the nail is kept straight.

The compressing rollers having now shaped the nail from neck to joint, the toggle-joints *s s*, cease to act in closing the sliding levers *h h*, which are forced open by the action of springs; and the stretching holders quit their hold of the nail they have just brought forward, and are carried back to the compressing rollers by the sliding levers, in order to take up another nail. The returning motion of the sliding levers brings the heading holders *m, m*, to the holding bars *n, n*, and at the same instant that the stretching holders close upon another nail, the heading holders close upon that which has been just left between the holding bars, and carry it forward to the heading frame *q*, which is then moving, with the heading punch *r*, in an opposite direction, and the heading punch, forcibly meeting the nail, strikes up the head.

The shears now close, so as to complete the division of the nail from the rod, in case it should not have been already effected by the close approach of the compressing rollers; and the striker, descending with the upper shear, strikes down the finished nail into a basket, or other receptacle placed below the machine.

The patentee claims the invention and use of the compressing rollers, combined and used with the stretching rollers. The invention and use of the compressing rollers, combined and used with the guiding slides; the invention and use of the holding bars, combined and used with the stretching holders; and the invention and use of the holding bars, combined and used with the guiding slides, whether the stretching holders are made separately from the guiding slides, or whether the slides are made to act both as guides and stretching holders in one piece; and whether the hold is obtained by the projecting edges on the stretching holders, or by indentations, as aforesaid.—[Inrolled in the Inrolment Office, April, 1835.]

To JAMES JAMIESON CORDES, of *Idol-lane, in the city of London,* merchant, for a certain improvement or improvements in machinery for making rivets and screw-blanks, or bolts,—being a communication.—[Sealed 8th October, 1834.]

THE machine which is the subject of this invention, is similar, in many respects, to the patentee's machine for making nails, described in the present number, and consists of two cast-iron cheeks, or sides, firmly bolted together; in an opening in the front of which, between four posts *a, a*, are two moveable caps, or castings *b, b*, placed one above the other, as shewn in the drawing, fig. 5, in Plate XVIII., which is a back view of some of the principal parts of the machine. The lower cap rests on a key *c*, by which, and by four screws, *d, d*, that pass through the upper cap, and rest on the lower one, their positions, with respect to each other, are adjusted, and they are secured in their places by screws *e, e*, passing through two cross tightening bars, *f, f*, placed between the upper cap and the projecting shoulders *t, t*, of the posts *a, a*.

These caps *b, b*, carry two shafts *g, g*, upon each of which, against the shoulders *h, h*, a fluted steel roller *i, i*, is keyed; the two rollers *i, i*, being exactly opposite, and working in contact with each other. The shafts *g, g*, are geared together by two equal toothed wheels *j, j*, one upon each shaft; and on the lower shaft is a ratchet-wheel *k*, ratched on its outer side into as many divisions as there are screw-blanks, to be made during one revolution of the fluted rollers. The wheel *k*, is turned by the spring slide *l*, at the end of the alternating lever *m*, which moves freely on the same shaft as the wheel *k*, and is connected with the driving shaft of the machine; the spring slide is pressed against the wheel *k*, by a spring in the end of the lever *m*, (as shewn in section in the drawing,) and by the reciprocating action of that lever, derived from the continuous motion of the driving shaft, is made to turn the wheel *k*, round, one ratchet at a time, each backward movement of the lever *m*, causing the spring slide to pass over the inclined plane, and fall behind the shoulder of the next ratchet, in readiness for forcing that round, when the lever *m*, again moves forward.

At the front of the machine is a clasp, or head-piece, in which a pair of clasp or sliding levers are secured, in a similar manner to the levers *h, h*, in the nail machine; and on the clasp levers, in nearly the same position as the holders *m, m*, a pair of grooved heading holders are screwed, being suitably shaped for giving the required form to the heads of the screw-blanks. On projections of the frame, behind the heading holders, a heading frame, carrying a heading punch, slides similar to the frame *g*, in the nail

machine, and in like manner opens and closes the clasp, or sliding levers, by means of two levers, or toggles.

A tube *s*, to direct the rod or wire to be made into screw-blanks, extends from the front of the machine to the rollers *i*, *i*, and is again continued in the same direction beyond the rollers, the passage between which forms in some measure a connection between the two parts of the tube. The portion of the tube behind the rollers *i*, *i*, turns on a joint *n*, and is supported beyond that joint by a bar *o*, extending across the machine, turning at one end on a pin *p*, and being held up at the other end (which moves in a groove *q*), by a spring *r*, so that when the bar and tube have been depressed by a striker, as hereafter described, the spring, when the striker rises again, will restore the bar and tube to their former position.

The screw-blanks are severed by a chisel, fixed on a shear lever, which is worked by a rod from a crank on the driving shaft, and has a striker fastened to the front of it.

The mode of making screw-blanks, &c. by this machine, is as follows:—The rod, or wire, out of which they are to be made, having been heated in a furnace, is conducted through the tube *s*, to the rollers *i*, *i*, which, revolving, draw it in between them, and pass it through the jointed continuation of the tube, and between the heading holders, its end projecting slightly beyond the latter. The heading holders now close on the rod, and the heading frame at the same time moving towards them, the heading punch strikes up the head of the screw-blank; but just before this movement, the chisel descends, cuts off the screw-blank close to the back of the heading holders, and acts as a stop to the divided part of the rod, while receiving the blow of the heading punch. As the chisel descends, the striker, above-mentioned, makes room for it, by depressing the jointed end of the tube *s*, with the rod enclosed in it; and, when it rises again, the tube is returned to its original position by the spring *r*. The finished screw-blank, being forced out of the tube *s*, by the advance of the rod, falls into a basket, or other suitable receptacle, and the same process is repeated.

The patentee claims the combination of the chisel with the heading holders, and the combination of the tube *s*, with the fluted rollers and heading holders.—[*Inrolled in the Inrolment Office, April, 1835.*]

To GEORGE LITTLEWORT, of Rahere-street, Goswell-road, in the county of Middlesex, watch and clock-maker, for certain improvements in watches and clocks.—[Sealed 17th October, 1834.]

THE first part of this invention consists in an improvement in the pallets of clocks and watches.

In Plate XVIII., fig. 1, is a front, and fig. 2, an edge view of an improved pallet, the safety edges *a, a*, of which, stand at right angles to the legs *b, b*, that carry them; by this means, their faces *c, c*, can be turned into true portions of a circle, more readily than when the pallet is constructed in the usual manner.

The second part consists in an improved mode of hanging the spindle or axis of the balance-wheel, and is shewn in figs. 3 and 4. *d*, is the balance-wheel; *e*, its spindle, one end of which is supported at *f*, as usual; but the other end, instead of being supported by the main potance *g*, (the upper part of which is removed,) is carried by a support *h*, which, being independent of the main potance, may be got at with great facility.

The patentee claims, firstly, the improvement in the pallets of clocks and watches; and secondly, the application of the bearing or support *h*, to one end of the spindle or axis of the balance-wheel, and thus hanging the spindle independently of the main potance.—[Inrolled in the Inrolment Office, April, 1834.]

To CLAUDE MARIE HILIARE MOLINARD, of Brewer-street, Golden-square, in the county of Middlesex, for a certain improvement in looms or machinery for weaving fabrics,—communicated by a certain foreigner, residing abroad.—[Sealed 17th October, 1834.]

THIS improvement relates to a mode of selecting the warp-threads, in order to produce ornamented fabrics, and consists in applying, to a figure loom, a body of needles, (instead of the ordinary Jacquard movement,) acted upon by the rise and fall of a pattern-shaft or cylinder, in the way described in the specification of a patent granted to the present patentee the 9th day of April, 1833; but in this improvement, instead of dismantling the loom, the warp, mailes, and mounture, are left just as usual in a Jacquard loom, the threads of the mounture being suspended from the needles by lifting or suspension-threads.

In Plate XVIII., fig. 1, is a front view, and fig. 2, a side view, partly in section, of the improved figuring movement. *a, a*, are the needles, passing through two guide-plates *b*, and *c*,—the upper plate *b*, being fixed, and the lower one *c*, sliding in grooves in the cheeks of the frame *d*, of the figuring movement, with the needles that are lifted by the pattern card. The needles are plain straight wires, with heads *e*, formed on their upper ends, which rest on the guide-plate *b*, to prevent their falling too low; and through each head a hole is drilled, for the purpose of fastening a suspension thread *f*, thereto. These threads are, as before mentioned, fastened to the threads of the mounture, by

which the mailles are suspended, and passing through the holes in the guide-plate *b*, are secured to the heads of the needles.

g, g, are the pattern-cards, passing over the pattern-shaft or cylinder *h*, which is mounted in the frame *d*, suspended by straps *i*, from two pullies *j*, on the shaft *k*; and motion is communicated to this shaft, for the purpose of elevating the pattern-cylinder, when required, by depressing a treadle, connected with a cord that passes round a grooved pulley on one end of the shaft.

The operation of this figuring machine is as follows:—The pattern cylinder being raised by the depression of the treadle, just mentioned, the pattern-card comes in contact with the lower ends of the needles, and the blank parts of the card lifting some of the needles, causes the elevation of the warp-threads, which are connected to them; but the warp-threads of those needles that are over the holes in the pattern-card, are not lifted, and thus the warp is divided, in a suitable manner, for making figured fabrics, the blank parts of the cards, and not the holes, corresponding with the figure intended to be produced.

When the pattern cylinder descends, it is turned one-sixth of a revolution, in order to bring a fresh pattern-card beneath the needles, by means of a trundle *l*, of six teeth, on one end of it, drawn round by a catch *m*, suspended from the end *p*, of the lever *o*, by the universal joint *n*. The lever *o*, turns on a centre at *q*, and its end *r*, is connected by the rod *s*, with the frame *d*, at *t*. Hence, when the frame *d*, is raised, the end *r*, of the lever will rise, and its other end descend, and the catch *m*, will come under the next bar or tooth of the trundle; and when the frame *d*, descends, the end *r*, of the lever *o*, will descend with it, and the end *p*, ascending, will cause the catch to turn the trundle (and consequently the pattern-cylinder) one-sixth of a revolution, thereby presenting a fresh card to the lower ends of the needles.

Instead of the pattern-cylinder rising to the needles, they may descend to it, and in that case, the holes in the cards will correspond with the required figure, and the warp-threads will be raised by the descent of the needles.

In another mode of applying this improvement, two sets of needles are used, one set being placed above the other in the frame; the upper set are twice as numerous as the lower. The lower set is elevated by the rising of the pattern-cylinder, and coming under the lower end of the needles of the upper set, lifts them also, thereby raising the warp-threads connected to them. The needles of the lower set have large heads, with two holes bored in them, to receive the lower ends of two of the upper needles, and are shogged at intervals, for the purpose of removing each row of needles of the lower set from under one of the rows of upper needles which they lifted last, and bringing them under a fresh row, in order that the next time they are elevated by the

pattern-cylinder, they may raise that row, together with one of the two rows they lifted last.—[Inrolled in the Inrolment Office, February, 1835.]

To JOHN HEARLE, of Devonport, in the county of Devon, engineer, plumber and founder, for certain improvements on engine-pumps, applicable to ships and every other purpose that a pump can be applied to.—[Sealed 3rd November, 1834.]

These improvements consist in enclosing lift or forcing pumps in a vessel, capable of being made air-tight, in such a manner as to afford protection to the mechanism connected therewith, and at the same time answer the purpose of an air-chamber, when the pumps are required to be used as force-pumps, or for other purposes.

The container or vessel, in which the pumps (two in number) are enclosed, is of an oblong shape, and having a flange at the bottom, through which a number of screws pass, to secure it to a flange on the upper part of a shallow vessel, called a bed or receiver, which receives the water delivered by the suction-pipes. The container is closed at the top by an air-tight cover, and has, at the lower part of it, two metal screws, with caps, to screw the discharging-pipes or hose on, when it is used as a fire-engine; it has likewise, at the lower part of it, a metal cap and screw of a larger size, which is taken off when it is used as a lifting house or ship's pump, and no air-vessel is required. There are also metal screws and caps on each side of the bed or receiver, and to these the suction-pipes or hose are attached.

The pump-barrels, which are open at the top, are fastened to the bottom of the container, and the pump-rods are attached to the ends of a horizontal beam or lever, mounted at its centre on a long axis, which protrudes through the sides of the container; and on its ends, a cross-handle brake, or a single brake, or pump-handle, is fastened, to work the pumps, according as the pumps are to be used, whether as lifting or forcing-pumps.

The patentee claims, first, the container herein described; and secondly, the arrangement of brakes and levers, by means of which the engine may be used as a lift or force-pump, at pleasure.—[Inrolled in the Inrolment Office, May, 1835.]

To JEAN MICHEL CRAMER, of Leicester-square, in the county of Middlesex, mechanic, for an improved steam-engine.—[Sealed 13th November, 1834.]

THIS improved steam-engine is provided with three cylinders,

connected together and radiating from a common centre, round which they revolve, by reason of their piston-rods being each attached to arms from an excentric. The working of the supply-pump is effected by means of an excentric on the main shaft, capable of being adjusted in a peculiar manner, for the purpose of regulating the length of the stroke.

In Plate XVIII., fig. 1, is a partial side view of the engine.—*a, a, a*, are the cylinders, fastened to the plate *b*, on the main shaft *c*; this plate has three induction holes *d, d, d*, and three eduction holes *e, e, e*, in it, each induction hole communicating with the bottom of its respective cylinder, and each eduction hole communicating, by a pipe *f*, with the top of its cylinder.

The piston-rods *g, g*, carry cross-heads *h, h*; and to these are attached the arms *j, j*, of the rings *k*, three of which (each having one arm *j*,) are placed at each side of the engine, and slide round two broad discs *l*, carried by two short shafts *m*; and as these shafts are placed excentric to the circle, described by the plate *b*, the movement of the piston-rods *g*, forcing the rings *k*, (by means of their arms, attached to the cross-heads,) to slide round the discs *l*, will cause the cylinders to travel in a circular orbit, and hence communicate a revolving motion to the main shaft *c*. The dotted circle shews the course of the cross-heads *h*.

The mode of working the supply-pump, by means of an adjustable excentric, is shewn in section at fig. 2. *n*, is a circular boss, which has a mortice formed in it, and fits upon a part of the main shaft *c*, that is cut into a tenon; upon this shaft, within the mortice in the boss *n*, a forked tube *o*, slides, carrying the two wedges *p, p*, which occupy the remainder of the mortice, the tube being moved backwards and forwards by the lever *q*, when desired. *r*, is a metal band or ring, which passes round the boss *n*, and is attached to the pump-rod *s*.

Now, it will be evident, that while the parts are in the position shewn in the drawing, (the main shaft being in the centre of the boss *n*,) the boss *n*, will continue revolving within the ring *r*, without communicating any motion to the pump-rod; but if, by means of the lever *q*, the parts are moved into the position shewn by dotted lines, then (the main shaft not being in the centre of the boss *n*,) the boss becomes an excentric, and moves the pump-rod up and down. *t*, is a graduated scale, by which the movement of the lever *q*, is regulated.

The patentee claims the triple cylindered engine, herein described, with the stationary plate, containing the induction and eduction steam channels; also the sliding tube and wedges, for regulating, by means of a lever, the supply of water from the engine feed-pump.—[Inrolled in the Inrolment Office, May, 1835.]

To FRANZ ANTON BERNHARDT, of Montague-street, Montague-square, in the County of Middlesex, architect, for certain improvements in warming and airing buildings.—[Sealed 4th December, 1834.]

THIS invention consists in a mode of warming and airing buildings, by which the air is caused to be constantly changing, and the building is warmed by one fire-place in the basement story; the temperature being kept at any required elevation, without the necessity of opening or shutting the doors or windows.

Under the kitchen-floor is a reservoir for the reception of cold air, which is admitted into it from the atmosphere by an opening covered with wire gauze, which may be closed by a valve, when required. From the reservoir the air passes into a close chamber, where it is warmed by two winding flues from a cooking-stove in the kitchen, and is thence conveyed by pipes into the different apartments, into which also cold air is conducted by pipes from the reservoir; the quantities of hot and cold air admitted into the apartments being regulated by valves. The vitiated and impure air is carried by pipes into the flue from the kitchen stove, which proceeds in a vertical direction from the kitchen to the attic, and then makes several horizontal bends before it terminates in the chimney top. The upright part of this flue is cleansed, without the aid of climbing-boys, by placing a pulley over the top of it, and, by means of a rope, drawing a large brush up and down: and the horizontal bends in the attic, are cleaned by a hand-brush, through small doors in the sides of the flue.

The building, thus warmed and aired, is lighted by gas, consumed in lamps provided with pipes for supplying air, and carrying off the products of combustion; and these lamps effectually cut off any communication between the burners and the atmosphere of the room.

A mode of keeping the air untainted in rooms occupied by sick persons, also constitutes a part of this invention.

For this purpose, the bedstead, whereon the patient lies, is closed at three of its sides, and has an air-tight cover, from which a pipe leads into the atmosphere, carrying off all noxious exhalations, pure air, either warm or cold, being continually admitted into the apartment by pipes from the hot and cold air receptacles.—[Enrolled in the Enrolment Office, June, 1835.]

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 389, Vol. XX.)

February 22, 1842.

WILLIAM CUBITT, V.P., in the Chair.

“ Holborn Hill, and the Plans for its Improvement.”

By John Turner.

This communication chiefly consists of an examination of the various plans which have been suggested for diminishing the acclivity of that crowded thoroughfare. An idea of its thronged state is given from Mr. Whishaw's evidence before a Committee upon Metropolitan Improvements, in May, 1838, wherein he assumes the fair average annual amount of traffic between Fetter Lane and the Old Bailey at “ 20,000,000 pedestrians, 871,640 equestrians, 157,752 hackney coaches, 372,470 carts and waggons, 78,876 stages, 82,258 carriages, 135,842 omnibuses, 460,110 chaises and taxed carts, and 354,942 cabs.”

The necessity for ameliorating this great thoroughfare has been generally acknowledged, and great changes have been made in the locality since the rivulet called the “ Old Bourne” took its course down the hill into the Fleet river, which at that time had wharfs on either side for landing goods from the barges, which came up as far as Holborn Bridge. About the year 1733 the arching over of the channel of the Fleet was commenced, and subsequently was extended to the Thames, forming at present one of the main sewers, having its outlet at Blackfriars Bridge. On arching over the Fleet the ground at the bottom of the hill was raised as much as possible; indeed all that can be done by filling up (having reference to the surrounding levels), would appear to have been done at various intervals.

The oldest plan mentioned by the author is that by Mr. T. F. Taylor, in 1828. He proposed to divide the hill at the corner of

Hatton Garden, into three parts, and to continue the same up Skinner Street, nearly to the Saracen's Head Inn : between these points an iron suspension bridge, with a level roadway, was to be erected wide enough to admit of two carriages abreast, leaving the footpaths and nearly all the houses undisturbed. The estimate for this plan was about £23,000.

In 1833 the author proposed to construct a bridge or viaduct, upon arches, along the south side of Holborn Hill and Skinner Street, from Thavies Inn to Sea-coal Lane. The arches would have been available for warehouses upon the level of that half of the street which preserved its original position. On this plan it would have been necessary to take down all the houses on the south side from Shoe Lane to Farringdon Street; the others being modern, might have been raised. This plan was subsequently modified, and the width of the street increased to 70 feet, giving the viaduct 35 in breadth.

Mr. Moseley's proposition in 1833, was to fill up the valley to the height of 12 feet at Holborn Bridge, altering some of the houses at the bottom. In 1840 he further proposed to take 18 inches off the brow of Holborn Hill and 12 inches off Skinner Street, which, with raising the bottom, would bring the gradient of the acclivity to about 1 in 35.

Some interesting tables are given of the rates of acclivities of some of the principal thoroughfares in London.

St. James's Street, at 660 feet from Piccadilly, is	1 in 27
Waterloo Place, ending at Piccadilly	1 „ 25
Haymarket, at 490 feet from ditto	1 „ 23
Strand, opposite Northumberland House . .	1 „ 33
Charing Cross, from ditto towards Whitehall .	1 „ 37
Southampton Street, from the Strand . . .	1 „ 19
Fleet Street, opposite Salisbury Court . . .	1 „ 42½
Ludgate Hill, ending at St. Paul's Churchyard .	1 „ 25
Holborn Hill, varies from . . . 1 in 16½ to	1 „ 23
Skinner Street, varies from . . . 1 „ 24 to	1 „ 29

Messrs. Barnard and Geary published a plan, in 1836, for carrying a viaduct along the north side of Holborn Hill, between Hatton Garden and the upper end of Snow Hill, removing the

greater portion of the houses between those points. The estimate of the expense was £350,000.

In the Second Report of the Metropolitan Improvements Committee for 1838, appeared a plan by Mr. Pocock, consisting of a viaduct on the south side of the hill, between St. Andrew's Court and Sea-coal Lane.

Mr. Galloway's plan, in 1841, was to erect in the centre of the present line of road a viaduct upon iron arches, between Hatton Garden and the Saracen's Head Inn; this viaduct was to be 30 feet wide, and used for horses and carriages only, leaving the street below as at present, only widening it where requisite.

Mr. Moon's plan, in 1841, was nearly similar to Mr. Turner's, only insisting upon a greater width of road.

Several propositions were also made for forming a new street either on the north or south side of Holborn Hill; among them are mentioned the following plans:—

Mr. Davey's in 1833, which was to commence at Fox Court, in Gray's Inn Lane, cross Saffron Hill, and proceed in the form of a crescent to meet Skinner Street above Snow Hill.

Mr. Whishaw's plan, in 1835, was to build a viaduct, commencing at the end of Fetter Lane, to the north of New Street Square; thence across Farringdon Market, which he proposed to render more convenient and airy, and to terminate at the top of the Old Bailey, the roadway throughout being perfectly level.

Mr. Ross's plan resembled Mr. Whishaw's, but was less comprehensive, and avoided Farringdon Market, the viaduct being still nearly level.

These latter plans were laid out with a view of avoiding the existing thoroughfare, and the valuable property on Holborn Hill and Skinner Street.

The plans were collected by the author for the purpose of showing their comparative merit and originality, and (as far as he was able) the dates.

The communication was illustrated by a series of Drawings and Lithographs of almost all the schemes, with prospectuses of nearly all for reference.

Original Paper.

ON POTATO SUGAR.

BY ANDREW URE, M. D., F. R. S., CONSULTING AND
ANALYTICAL CHEMIST.

About two years ago, a sample of sweet mucilaginous liquid was sent to me for analysis, by the Honorable the Commissioners of Customs. It was part of a quantity imported in casks at Hull, from Rotterdam. It was called, by the importers, "vegetable juice." I found it to be imperfectly saccharified starch or fecula; and, on my reporting it as such, it was admitted at a moderate rate of duty.

Three months since, I received a sample of a similar liquid from the importer at Hull, with a request that I would examine it chemically. He informed me, that an importation, just made by him of 30 casks of it, had been detained by orders of the Excise, till the sugar duty of 25s. per cwt. of solid matter it contained, was paid upon it. It was of specific gravity 1.362, and contained 80 per cent. of ill-saccharified fecula.

In the interval between the first importation and the second, an Act of Parliament had been obtained for placing every kind of sugar, from whatever material it was formed, under the provisions of the "Beet-root Sugar Bill." As the saccharometer tables, subservient to the levying of the excise duties, under this Act, were constructed by me, at the request of the President of the Board of Trade, I well knew that 50 per cent. of the syrup of the beet-root was deducted as a waste product; because beet-root molasses are too crude an article for the use of man. Well saccharified starch paste, however, constitutes a syrup, poor indeed in sweetness, when compared with cane syrup, or that of the beet-root; but then, it does not spontaneously blacken into molasses, by evaporation, as solutions of ordinary sugar never fail to do, when they are concentrated, even with great care. Hence

the residuary syrups of saccharified fecula may be all worked up into a tolerably white granular mass, which, being crushed, is used by greedy grocers to mix with their dark-brown bastard sugars, to improve their colour.

It is only within two years that sugar has been in this country manufactured from potato starch to any extent, though it has been long an object of commercial enterprise in France, Belgium, and Holland, where the large coarse potatoes are used for this purpose. The raw material must be very cheap there, as well as the labour; for potato flour or starch, for conversion into sugar, has been imported from the continent, into this country, in large quantities, and sold in London at the low price of 16s. per cwt.

The process usually followed by the potato sugar makers, is to mix 100 gallons of boiling water with every 112 lbs. of the fecula, and 2 lbs. of the strongest sulphuric acid. This mixture is boiled about twelve hours in a large vat, made of white deal, having pipes laid along its bottom, which are connected with a high pressure steam-boiler. After being thus saccharified, the acid liquid is neutralized with chalk, filtered, and then evaporated to the density of about 1.300, at the boiling temperature, or exactly 1.342, when cooled to 60°. When syrup, of this density, is left in repose for some days, it concretes altogether into crystalline tufts, and forms an apparently dry solid, of specific gravity 1.39. When this is exposed to the heat of 220° it fuses into a liquid, nearly as thin as water; on cooling to 150° it takes the consistence of honey, and at 100° F. it has that of a viscid varnish. It must be left a considerable time at rest before it recovers its granular state. When heated to 270°, it boils briskly, gives off one-tenth of its weight of water, and concretes, on cooling, into a bright yellow brittle, but very deliquescent mass, like barley-sugar. If the syrup be concentrated to a much greater density than 1.340, as to 1.362, or if it be left faintly acidulous, in either case, it will not granulate, but will remain either a viscid magma, or become a concrete mass, which may indeed be pulverized, though it is so deliquescent as to be unfit for the adulteration of raw sugar. The Hull juice is in this pre-

dicament, and is therefore, in my opinion, hardly amenable to the new sugar law, as it cannot, by any means, be worked up into even the semblance of sugar.

Good Muscovado sugar, from Jamaica, fuses only when heated to 280° , but it turns immediately dark-brown, from the disengagement of some of its carbon, at that temperature, and becomes, in fact, the substance called "caramel," by the French, which is used for colouring brandies, white wines, and liqueurs.

Thus we see that starch or grape sugar is well distinguished from cane sugar, by its fusibility, at a moderate heat, and its inalterability at a pretty high heat. Its sweetening power is only two-fifths of that of ordinary sugar. A good criterion of incompletely formed starch sugar, is, its resisting the action of sulphuric acid, while perfectly saccharified starch or cane sugar is readily decomposed by it. If, to a strong solution of imperfectly saccharified grape sugar, nearly boiling hot, one drop of strong sulphuric acid be let fall, no perceptible change will ensue, but if the acid be dropped into solutions of either of the other two sugars, black carbonaceous particles will make their appearance.

The article which was lately detained by the Excise, for the high duties, at Hull, is not affected by sulphuric acid, like the solutions of cane sugar, and of the well-made potato sugar of London; and for this reason I gave my opinion in favour of admitting the so called vegetable juice at a moderate rate of duty.

I subjected the solid matter, obtained by evaporating the Hull juice, to ultimate analysis, by peroxide of copper, in a combustion tube, with all the requisite precautions, and obtained, in one experiment, 37 per cent. of carbon; and in another 38 per cent., when the substance had been dried in an air-bath, heated to 275° . The difference to 100, is hydrogen and oxygen, in the proportion to form water. Now this is the constitution of grape sugar. Cane sugar contains about 5 per cent. more carbon, whereby it readily evolves this black element, by the action of heat or sulphuric acid.

An ingenious memoir, by Mr. Trommer, upon the distinguishing criteria of gum, dextrine, grape sugar, and cane sugar, has been published in the 39th volume of the "*Annalen der Chemie*"

und Pharmacie." I have repeated his experiments, and find them to give correct results, when modified in a certain way. His general plan is to expose the hydrate of copper to the action of solutions of the above-mentioned vegetable products. He first renders the solution alkaline, then adds solution of sulphate of copper to it, and either heats the mixture or leaves it for some time in the cold. By pursuing his directions, I encountered contradictory results, but by the following method, I have secured uniform success, in applying the criteria, and have even arrived at a method of determining, by a direct test, the quantity of sugar in diabetic urine.

I dissolve a weighed portion of sulphate of copper in a measured quantity of water, and make the solution *faintly* alkaline, as tested with turmeric paper, by the addition of potash lye, in the cold; for if the mixture be hot, a portion of the disengaged green hydrate of copper is converted into black oxide. This mixture being always agitated before applying it, forms the test liquor. If a few drops of it be introduced into a solution of gum, no change ensues on the hydrate of copper, even at a boiling heat, which shows that a gummate of copper is formed, which resists decomposition; but the cupreous mixture, without the gum, is rapidly blackened at the boiling temperature. I do not find that the gummate is re-dissolved by an excess of water, as Trommer affirms.

Starch and tracaganth comport like gum, in which respect I agree with Trommer. Starch, however, possesses already a perfect criterion, in iodine water. Mr. Trommer says, that solution of dextrine affords a deep blue coloured liquid, without a trace of precipitate; and that when his mixture is heated to 85° C., it deposits red grains of protoxide of copper, soluble in muriatic acid. I think these phenomena are dependent, in some measure, upon the degree of alkaline excess in the mixture. I find, that solution of dextrine, treated in my way, hardly changes in the cold, but when heated slightly, it becomes green, and by brisk boiling, an olive tint is produced. It thus betrays its tendency of transition into sugar.

Solution of cane sugar, similarly treated, undergoes no change in the cold at the end of two days; and very little change of colour even at a boiling heat, if not too concentrated. Cane sugar, treated by Trommer in his way, becomes of a deep blue; it can be boiled with potash in excess, without any separation of orange-red oxide of copper.

Starch or grape sugar has a marvellous power of reducing the green hydrate of copper to the orange oxide. I find, however, that it will not act upon the pure blue hydrate, even when recently precipitated; it needs the addition, in every case, of a small portion of alkali. Yet ammonia does not seem to serve the purpose; for, in using the ammonia sulphate of copper, in solution, I obtained unsatisfactory results with the above vegetable products.

The black oxide of copper is not affected by being boiled in solution of starch sugar.

"If solution of grape sugar," says Trommer, "and potash, be treated with a solution of sulphate of copper, till the separated hydrate is re-dissolved, a precipitate of red oxide will soon take place, at common temperatures, but it immediately forms, if the mixture is heated. A liquid containing $\frac{1}{1000000}$ of grape sugar, even one-millionth part," says he, "gives a perceptible tinge, (orange,) if the light is let fall upon it." To obtain such a minute result, very great nicety must be used in the dose of alkali, which I have found it extremely difficult to hit. With my regulated alkaline mixture, however, I never fail in discovering an exceedingly small portion of starch sugar, even when mixed with Muscovado sugar; and thus an excellent method is afforded of detecting the frauds of the grocers.

I find, that manna deoxidizes the green hydrate of copper slowly when heated, but not nearly to the same extent as grape sugar, which reduces it rapidly to the orange oxide.

If an excess of the hydrate of copper test be used, there will be a deposit of green hydrate at the bottom of the vessel, under the orange oxide.

To apply these researches to the sugar of diabetic urine:— This should first be boiled briskly to decompose the urea, and to

dissipate its elements in the form of ammonia, as well as to concentrate the saccharine matter, whereby the test becomes more efficacious. Then add to the boiling urine, in a few drops at a time, the cupreous mixture, containing a known quantity of sulphate of copper, till the whole assumes a greenish tint, and continue the heat until the colour becomes bright orange. Should it remain green, it is a proof that more hydrate of copper has been introduced than has been equivalent to the deoxidizing power of the starch sugar. I have found that one grain of sulphate of copper in solution, supersaturated very slightly with potash, is decomposed with the production of orange protoxide, by about 3 grains of potato sugar; or, more exactly, 30 parts of the said sulphate, in the state of an alkaline hydrate of copper, pass altogether into the state of orange oxide, by means of 100 parts of granular starch sugar. Thus for every 3 grains of sulphate so changed, 10 grains of sugar may be estimated to exist in diabetic urine.

Acetate of copper may be used in the above experiments, but it is not so good as the sulphate. The chloride of copper does not answer.

Specific gravity is also an important criterion, applied to sugars; that of the cane and beet-root is 1.577; that of starch sugar, in crystalline tufts, is 1.39, or perhaps 1.40, as it varies a little with its state of dryness. At 1.342, syrup of the cane contains 70 per cent. of sugar; at the same density, syrup of starch sugar contains $75\frac{1}{2}$ per cent. of concrete matter, dried at 260° F., and therefore freed from the 10 per cent. of water which it contains in the granular state. Thus another distinction is obtained between the two sugars, in the relative densities of their solutions, at like saccharine contents per cent.

13, *Charlotte Street, Bedford Square,*
June 10th, 1842.

Scientific Adjudication.

COURT OF COMMON PLEAS, WESTMINSTER HALL,

June 13th, 1842.

BEFORE THE LORD CHIEF JUSTICE, MR. JUSTICE COLTMAN,
MR. JUSTICE MAULE, AND MR. JUSTICE CRESSWELL.

CRANE *v.* PRICE AND OTHERS.

This action, for an infringement of a patent granted to the plaintiff for the application of Neilson's hot-air blast to anthracite coal for smelting, was tried last term before CHIEF JUSTICE SIR N. TINDAL, and, being referred by him to the opinion of the Judges, now came on for final decision.

JUDGMENT.

The Lord Chief Justice: This was an action on the case for the infringement of a patent granted to the plaintiff on the 28th September, 1836, for an improvement in the manufacture of iron. The declaration was in the usual form, and the defendants pleaded thereto—first, that they were not guilty; secondly, that the plaintiff was not the first and true inventor of the said improvement—upon each of which pleas issue was joined; thirdly, after setting out at length the plaintiff's specification, the defendants pleaded that the alleged improvement therein described was not a new manufacture invented by the plaintiff within the intent and meaning of the statute, as to the public use and exercise thereof in England; which allegation was traversed by the plaintiff in his replication; fourthly, the defendant pleaded that the nature of the plaintiff's invention, and the manner in which it was to be performed, was not particularly described or ascertained by the plaintiff in his specification, upon which plea issue was joined; and in their last plea the defendants, after referring to the plaintiff's specification before set out in the third plea, stated the grant of letters patent, dated the 11th of September, 1828, to one James Beaumont Neilson, for an improved application of air to produce heat in fires, forges, and furnaces, where bellows and other blowing apparatus were required; that Neilson's invention was the production and application of a hot-air blast, and was in public use with Neilson's license in the smelting and manufacturing of iron from iron-stone, and was the hot-air blast in the plaintiff's specification mentioned; that the plaintiff could not use the hot-air blast mentioned in his specification without Neilson's license, and that he had obtained such license before the grant of his letters patent, and that the using, by the plaintiff, of the hot-air blast in the smelting of iron from iron-stone, combined with anthracite or stone-coal, as mentioned in his specification, was a using and imitating of Neilson's invention, whereby the plaintiff's patent was void. The plaintiff replied to this last plea, that Neilson's invention was not the same hot-air blast; and that the machinery and apparatus adapted for the application thereof, mentioned and referred to in the plaintiff's specification, was not, nor was the using by the plaintiff of the invention, as described in his specification, a using and imitating of Neilson's invention, described in Neilson's specification; which allegation is traversed by the defendants in their rejoinder. At the trial before me a verdict was entered for the plaintiff on all the issues, subject to the opinion of the court upon the evidence given at the trial, as contained in a report agreed upon between the parties; the court being at liberty to draw the same inference from it as a jury might

draw. On the argument, it was contended by the defendants that the verdict ought to be entered for them on each of the issues joined on the record; but as the main question between the parties turns on the third issue, which involves the question whether the invention of the plaintiff is a manufacture within the intent and meaning of the statute of James—that is, whether it is or is not the subject matter of a patent; and, as the determination of this issue in favour of the one party or the other will render the decision of the other issues free from difficulty, the simplest way will be to apply ourselves, in the first instance, to that question. Now, in order to determine whether the improvement described in the patent is or is not a manufacture within the statute, we must, in the first place, ascertain precisely what is the invention claimed by the plaintiff, and then, by the application of some principles admitted and acknowledged in the application of the law relating to patents, and by the authority of decided cases, determine the question in dispute between the parties. The plaintiff describes the object of his invention to be the application of anthracite, or stone-coal, combined with hot-air blast, in the smelting or manufacture of iron from iron-stone, mine, or ore, and states, distinctly and unequivocally, at the end of his specification, that he does not claim the use of a hot-air blast separately, as of his invention, when uncombined with the application of anthracite, or stone-coal; nor does he claim the application of anthracite, or stone-coal, when uncombined with the using of hot-air blast; but that what he claims as his invention, is the application of anthracite, or stone-coal and culm, combined with the using of hot-air blast, in the smelting and manufacture of iron from iron-stone, mine, or ore. And the question, therefore, becomes this, whether, admitting the using of the hot-air blast to have been known before in the manufacture of iron with bituminous coal, and the use of anthracite and stone-coal to have been known before in the manufacture of iron with cold blast, but that the combination of the two together (the hot blast and the anthracite) were not known to be combined before in the manufacture of iron, whether such combination can be the subject of a patent? We are of opinion that if the result produced by such a combination is either a new article, or a better article, or a cheaper article to the public, than that produced before by the old method, that such combination is an invention or manufacture intended by the statute, and may well become the subject of a patent. Such an assumed state of facts falls clearly within the principle exemplified by Abbot, Chief Justice, in the case of *The King v. Wheeler*, 2nd Barnewell and Adolphus, 349, where he is determining what is, or what is not, the subject of a patent, namely, it may perhaps extend to a new process, to be carried on by known implements, or elements acting upon known substances, and ultimately producing some other known substance, but producing it in a cheaper or more expeditious manner, or a better or more useful kind; and it falls, also, within the doctrine laid down by Lord Eldon, in *Hill v. Thompson*, in 3rd Merivale, 629, namely, there may be a valid patent for a known combination of materials previously in use for the same purpose, or even for a new method of applying such materials; but the specification must clearly express that it is in respect of such new combination or application. There are numerous instances of patents which have been granted, where the invention consisted in no more than in the use of things already known, and acting with them in a manner already known, and producing effects already known; but producing those effects so as to be more economically or beneficially enjoyed by the public. It will be sufficient to refer to a few instances, some of which patents have failed on other grounds, but none on the ground that the invention itself was not the subject of a patent. We may first instance Hull's patent for applying the flame of gas to singe off the superfluous fibres of lace, where a flame of oil had been used before for that same purpose; Derosne's patent, in which the invention consisted in filtering the syrup of sugar through a filter, to act with animal charcoal, and charcoal from bituminous schistues,

where charcoal had been used before in the filtering of almost every other liquor except the syrup of sugar; Hill's patent, in 3rd Merivale, above referred to, for improvements in the smelting and working of iron, where the invention consisted only in the use and application of the slags or cinders thrown off by the operation of smelting, which had been previously considered useless for the production of good and serviceable metal by the admixture of mine-rubbish; again, Daniel's patent was taken out for improvements in dressing woollen cloth, where the invention consisted in immersing a roll of cloth, manufactured in the usual manner, into hot water.—See "*I be King v. Daniel*," in Mr. Godson's Book on Patents, 274. The only question, therefore, that ought to be considered on the evidence is, was the iron produced by the combination of the hot-blast and the anthracite, a better or a cheaper article than was produced from the combination of the hot-blast and the bituminous coal? and was the combination described in the specification new as to the public use thereof in England? And upon the first point, upon looking at the evidence in the cause, we think there is no doubt that the result of the combination of the hot-blast with the anthracite, on the yield of the furnaces, was more, the nature, properties, and quality of the iron better, and the expense of making the iron less, than it was under the former process, by means of the combination of the hot-blast with the bituminous coal. It is to be observed, that no evidence was produced on the part of the defendants to meet that given by the plaintiff on these grounds, and that it was a necessary consequence, from the proof in the cause, that the substitution of the anthracite coal, in whole or in part, instead of or in the place of bituminous coal, from the substitution of that, the manufacture of the iron should be obtained at less expense. It was objected, in the course of the argument, that the quality or degree of invention was so small, that it could not become the subject-matter of a patent; that a person who could procure a license to use the hot-air blast under Neilson's patent, had a full right to apply that blast to coal of any nature whatever, whether bituminous or stone coal. But we think, if it were necessary to consider the labour, pains, and expense incurred by the plaintiff in bringing his discovery to perfection, that there is evidence in this cause that the expense was considerable, and the experiments numerous. But, in point of law, the labour of thought or experiments, and the expenditure of money, are not the essential grounds of consideration on which the question, whether the invention is or is not the subject-matter of a patent, ought to depend; for if the invention be new and useful to the public, it is not material whether it be the result of long experiments and profound research, or whether by some sudden and lucky thought, or mere accidental discovery. The Case of Monopolies, 11th Coke, states the law to be, that where a man, by his own charge or industry, or by his own wit or invention, brings a new trade into the realm, or any engine tending to the furtherance of a trade, that never was used before, and that was for the good of the realm, the king may grant him the monopoly of a patent for a reasonable time. If the combination now under consideration be, as we think it is, a manufacture within the statute of James I., there was abundant evidence in the cause, that it had been the great object and desideratum, before the granting of the patent, to smelt iron-stone by the means of anthracite coal, and that it had never been done before; there is no evidence on the part of the defendants to meet that which the plaintiff brought forward. These considerations, therefore, enable us to direct that the verdict ought to be entered for the plaintiff on the third issue; that it was a new manufacture—new as to the public use and exercise thereof within England and Wales. On the same ground, also, the second issue is disposed of in favour of the plaintiff; no evidence was produced on the part of the defendant to shew any inventor earlier than the plaintiff; nor does the fact that there was an earlier inventor appear from the cross-examination of the plaintiff's witnesses. As to the first issue, namely, whether the defendants had infringed the patent, we think

it clearly appears on the evidence, that the defendant had used, either in part or in whole, the combination described in the specification of the plaintiff's patent; the plaintiff's evidence goes fully to show certain infringements, and that is not met by any explanation on the part of the defendants. Indeed, the defendants' case did not appear to rest on this point at the trial, so much as on the important question raised by them, whether the improvement described in the specification was a manufacture within the statute of James I. Upon the fourth issue, which raised no more than the usual inquiry—whether the nature of the invention was sufficiently described in the specification—the usual evidence was given, that persons of competent skill and experience could, by following the direction, produce the manufacture described with success, and this evidence was entirely unopposed; upon this issue, also, the verdict ought to be entered for the plaintiff. With respect, however, to the issue raised in the rejoinder in the plaintiff's replication to the fifth plea, we are of opinion, that taking the whole evidence brought forward by the plaintiff, it is impossible to perceive any substantial or real distinction between the hot-air blast and the machinery and apparatus described in Neilson's specification, from that described or referred to in the plaintiff's; or to say that the using by the plaintiff of the invention described in his specification was any other than a using and imitating of the invention described in Neilson's specification. The plaintiff, indeed, worked by license under Neilson's patent at the time of his discovery; on this fifth issue, therefore, we find the verdict should be entered for the defendants. Then arises the question, whether the plaintiff is or is not entitled to the judgment, notwithstanding the verdict on the fifth issue? on which point the argument on the part of the defendants is, that the taking out a patent for an invention, which invention cannot be used or enjoyed by the public except by means of the former invention of another person, which former invention is itself the subject-matter of a patent still in force, is void by law. Undoubtedly if the second patent claims, as part of the invention described in it, that which had been the subject-matter of a patent then in force, it would be void, on the double ground that it claimed that which was not new, (which, indeed, would equally be the case if the former patent had expired), and also that it would be an infringement of, and inconsistent with, a former grant of the king still in force, which latter consideration alone would make a new grant void. But in this case there is an express disclaimer of any part of the invention to the use of the hot-air blast which was covered by Neilson's patent, the specification describing that the application of the hot-air blast was well understood, and extensively applied, in many places where ordinary fuel is employed. The validity, therefore, of the plaintiff's patent, cannot be impeached on either of the grounds above adverted to. Unless, therefore, the grantee of the new letters patent is bound by law to specify whether such former invention which is excepted, was so excepted on the ground of its being generally known and used by the public, and on the ground that it was the subject of a patent, that secured the use of it to a former patentee, the new patent will be good; but that distinction is as much in the knowledge of the public as the grantee of the patent. If, indeed, the new patent had been taken out for improvement or alterations in an invention secured by a former patent, then, for obvious reasons, greater particularity would be necessary to distinguish the new from the old. But the present specification expressly says:—"I take the whole of the invention, already well known to the public, and I combine it with something else." Now, it is further argued, that in point of law, no patent can be taken out which includes the subject-matter of a patent still running or in force. No authority was cited to support this proposition; and the case which was before Lord Tenterden, and in which he held that where an action was brought for improvements in a former patent, granted to another person, and still in force, that the plaintiff must produce the

former patent and signification, *that* at least affords a strong inference that the second patent was good; "*Lewis v. Davis*," 3rd Carrington, and "*Payne and Harmer v. Payne*," 11th East, are clear authorities on the same point; and upon reason and principle there appears to be no objection. The new patent, after the expiration of the old one, will be free from every objection; and whilst the former exists, the new patent can be legally used by the public, by procuring a license from Neilson, or by purchasing the apparatus from him or some of his agents; and the probability of the refusal of a license to any one applying for it is so extremely remote, that it cannot enter into consideration as a ground of legal objection. On the whole, therefore, we think the verdict is to be entered for the plaintiff on all the issues except the fifth; that the verdict is to be entered for the defendants on the fifth issue, but that, notwithstanding such verdict, the judgment must be given for the plaintiff.

Mr. M. Smith.—My Lord, there are certain certificates which were to be given, in case the judgment was for the plaintiff.

The Lord Chief Justice.—You must apply to me for those; that is not a matter for the Court—that is a matter for myself.

COURT OF QUEEN'S BENCH.

BEFORE LORD CHIEF JUSTICE DENMAN AND A SPECIAL JURY.

June 15, 1842.

SANDIFORD *v.* NIELD AND OTHERS.

This was an action for the alleged infringement of a patent, granted to the plaintiff June, 1838,* for "certain improvements in the art of block printing, and certain arrangements connected therewith."

The counsel for the plaintiff were the Attorney-General, Mr. Hill, and Mr. Crompton; for the defendant, Mr. Kelly and Mr. Webster.

The particular feature of novelty in the plaintiff's invention was, mounting the design or pattern to be printed upon a framework of wood, metal, or other suitable material, instead of having it formed by "cutting and brassing" upon a solid block. By the use of these frames, as stated in the specification, many advantages are obtained; for instance, the patterns or designs, which are formed upon thin slips of wood, may be screwed upon the rails of the framework, and at any time removed, and replaced by others with great facility, and also designs taken from old blocks may be employed.

The defendants pleaded that the process in question was not new, or useful, and that it was not a fit subject for a patent.

The trial lasted the whole of the day, and a verdict was found for the defendants.

BEFORE LORD CHIEF JUSTICE DENMAN AND A SPECIAL JURY.

June 18, 1842.

THE QUEEN *v.* JAMES WALTON.

This was a *scire facias* to repeal a patent, granted to the defendant, March, 1834, "for certain improvements in cards for carding wool, cotton, silk, and,

* For specification of patent, see Vol. XIV., p. 20, of our present series.

other substances." The counsel for the Crown were the Solicitor-General Mr. Thesiger, Mr. Richards, Mr. Cowling, and Mr. Cardwell; for the defendant, Sir T. Wilde, Mr. Kelly, Mr. Sergeant Bompas, and Mr. Addison. It will be remembered that the validity of this patent has been before questioned, but that the defendant has hitherto obtained a verdict in his favour.* The allegation in support of the prosecution was, that the invention was not new, and that Mr. Hancock, nearly ten years before the date of this patent, had applied a fabric, composed of India-rubber and cloth, to various purposes, and among others to the manufacture of cards for carding wool and cotton; in which he so fully succeeded, that Dr. Faraday, in the course of a lecture on the subject, (which lecture was published in the "Journal of Science" in 1826), adverted to the circumstance of the cards having been so manufactured by him. This closed the case for the prosecution, with the additional statement that cards had been manufactured in the way adopted by Mr. Hancock, from that time to the present.

The case for the defendant was, that the mode of manufacturing the cards patented by him, as well as the proportions of India-rubber employed, were so widely different from Mr. Hancock's mode of manufacturing, as to constitute a different fabric.

The cause occupied the attention of the Court for three successive days, and concluded by the jury returning a verdict for the Crown.

List of Patents

Granted by the French Government from the 1st of July to the 30th of September, 1840.

(Continued from Page 394, Vol. XX.)

Mathon, of Paris, for wheels made solid.

Menu, of Paris, for extirpating corns on the feet.

Mercier, of Paris, for improvements in piano-fortes.

Merle, of Paris, for improvements in clocks.

Migeon, Senr., of Rheims, for machinery applicable to spinning frames.

Minié, of Paris, for priming for fire-arms.

Modelon, of Paris, for a new mode of making beer.

Moro, of Paris, for an improved expanding frame.

Mothereau and Ledreux, of Batignolles, for hollow bricks.

Mousquet, of Cavaillon, for a fly-wheel, applicable to roasting jacks.

* For particulars of these actions, see Vol. XVIII., p. 45, and Vol. XIX., p. 378, of our present Series,

- Muston, of Amsterdam, for an impermeable fabric.
- Nouailhier, of Paris, for a new method of applying gold, by means of a brush.
- Nouguier, (Madame) of Paris, for a new description of stays.
- Ohnesorge, of Paris, for a new method of extracting liquids.
- Outrequin, of Paris, for a new cut of gloves.
- Pacquot, of Paris, for a new snap for purses, &c.
- Painchaud, Jun., of Morlaix, for an improved apparatus for preventing ships from running ashore.
- Pape, of Paris, for spring castors.
- Paris, of Paris, for a new motive power.
- Paul, of Paris, for a new cap for men.
- Paulet, of La petite Villette, for the crystallization of liquid molasses.
- Pètre, of Lyons, for an improved screw, to be used in presses for the extraction of the juice of grapes.
- Perieux, of Lyons, for a pen-holder containing ink.
- Pichon, of Paris, for a new pump.
- Pimont, of Rouen, for cloth without a seam, for covering rollers.
- Pion, of Paris, for an improved water-closet.
- Pion, of Elbeuf, for a new gas meter.
- Pion, of Elbeuf, for improvements in the manufacturing of candles.
- Pitour, of Paris, for an application of leather, paper, and woven fabrics, &c., on sheets of gelatine.
- Poliot, of Paris, for a portable chimney.
- Poncet, of Belleville, for fastenings for doors and windows.
- Prédaval, (the Count de,) for a covering for the keys of pianos.
- Privé and Duboc, of Déville, for a machine for printing calicoes.
- Proeschel, of Paris, for absorbing the moisture of new houses.
- Pujols, (eldest son,) of Bordeaux, for an apparatus for purifying sea water.
- Quernet, of Paris, for a new method of sizeing paper.
- Quibel, of St. Nicolas, Aliermont, for an improved chimney for kitchens.
- Quinet, of Paris, for an impermeable tissue.
- Quiquerez and Courtot, of Paris, for improved shoes.

- Rabot, of Paris, for a safety apparatus to be used in case of fire.
Recordon and Thomas Brillet, for a mechanical lamp.
Regard and Pernier, of St. Claude, for a machine for cutting deal timber.
Renaud, of Bordeaux, for an iron boat.
Renaud, of Tonnerre, for an improved grooving iron.
Renier, of Arras, for an oven for baking bread.
Riboud, of Lyons, for an improved water-closet.
Robert, of Paris, for an apparatus to be used instead of the wax wicks in sales by auction.
Rocher, of Paris, for improved buttons.
Rodier and Thuillier, of Paris, for the manufacturing of anew soap.
Rogé, of Paris, for a new fastening for windows.
Rohard, of Rheims, for an inexplosible gasometer.
Rosen, (The Count de,) of Paris, for an improved steam-engine.
Rousselet, of Paris, for a brush for a typographic machine.
Rouy, of Paris, for improvements in the manufacturing of nails.
Rugel, of Paris, for improvements in the suspension of carriages.
St. Etienne, of Paris, for improvements in the manufacturing of potatoe starch.
St. Joannis and Girod, of Marseilles, for bellows for a forge.
Salleron and Pichat Brémond and Co., of Paris, for a new fabric.
Sallier, Sen., of Lyons, for a machine for making spools.
Sassensy, (The Count de,) of Paris, for a furnace for annealing roller metals.
Schmitt, of Sarrable, for improvements in the carbonization of wood.
Scheiber and Loos, of Thann, for a machine for stretching cotton yarns.
Selligue, of Paris, for a gas-meter.
Sinfar, of Paris, for a vinegar for the toilet.
Siret, of Meaux, for a new process for the disinfection of foetid matters.
Soufflet, of Paris, for improvements in pianos.
Stevenel and Lavalette, of Châlons, for boxes for receiving bottles of Champagne wines.

Sterling, of Bordeaux, for a new method of closing the port-holes of ships.

Sterling, of Bordeaux, for improved boxes for wheels.

Tessié Dumotay, of Cholet, for a new gun.

Thébé, of Tarbes, for a machine for chopping rags for making paper.

Thillaye, of Rouen, for a fire-engine.

Thilorier, of Paris, for a new lamp,

Thonnellier, of Paris, for a stamping machine for stamping blanks, and to be used in coining.

Toai, of Vienne, for safety locks and padlocks.

Tourrette and Co., of St. Etienne, for an improved gun.

Trotry Latouche, of Paris, for a machine for printing stuffs.

Truc, of Paris, for a chafing dish, heated with spirits of wine.

Valognes, of Paris, for a mechanical process, called *mélochrone*.

Vial, of Paris, for a machine and process for the manufacturing of continuous paper and parchment.

Warée, of Paris, for a method of manufacturing purses.

List of Patents

That have passed the Great Seal of IRELAND, from the 17th May to the 17th of June, 1842, inclusive.

To Henry Bewley, of the City of Dublin, licentiate apothecary and chemist, for an improved Chalybeate water.—Sealed 21st May.

Edward Welch, of Liverpool, in the county of Lancaster, architect, for improvements in the construction of bricks.—Sealed 26th May.

List of Patents

Granted for SCOTLAND, subsequent to May 22nd, 1842.

To Joseph Clisild Daniell, of Tiverton Mills, near Bath, for improvements in making and preparing food for cattle.—Sealed 25th May.

Robert Logan, of Blackheath, in the county of Kent, Esq., for improvements in obtaining and preparing the fibres and other products of the cocoa-nut and its husk.—Sealed 28th May.

Thomas Henry Russell, of Wednesbury, in the county of Stafford, iron tube manufacturer, and **Cornelius Whitehouse**, of the same place, for improvements in the manufacture of welded iron tubing.—Sealed 28th May.

Thomas Middleton, of Loman-street, in the borough of Southwark, and county of Surry, engineer, for an improved method of preparing vegetable gelatine, or size for paper, and also an improved mode of applying the same in the manufacture of paper, —being a communication from abroad.—Sealed 6th June.

John Railton, of Blackburn, in the County Palatine of Lancaster, machine maker, for certain improvements in machinery or apparatus for weaving.—Sealed 6th June.

Thomas Hedley, of the Town and Borough of Newcastle-upon-Tyne, Gent., and **Cuthbert Rodham**, of Gateshead, in the county of Durham, millwright, for an improved apparatus for purifying the smoke, gases, and other noxious vapours, arising from certain fires, stoves, and furnaces.—Sealed 7th June.

John Burnell, the Younger, of High-street, Whitechapel, in the county of Middlesex, manufacturer, for improvements in the manufacture of leaves or sheets of horn, commonly called lantern leaves, and in the construction of horn lanterns.—Sealed 8th June.

Otto Rotton, of Gracechurch-street, in the City of London, Doctor of Medicine, for certain improvements in machinery or apparatus for spinning cotton, wool, and other fibrous substances,—being a communication from abroad.—Sealed 14th June.

New Patents

SEALED IN ENGLAND.

1842.

To William Young, of Queen-street, lamp-maker, for improvements in lamps and candlesticks.—Sealed 28th May—6 months for enrolment.

Philip Jacob Kayser, of Gracechurch-street, manufacturer, for improvements in the construction of lamps.—Sealed 31st May—6 months for enrolment.

Henry Phillips, of Exeter, chemist, for improvements in purifying gas, for purposes of light.—Sealed 31st May—6 months for enrolment.

Richard Watson, Jun., of Cloth Fair, gas-fitter, for improvements in draining land, embankments, and cutting of railways and other engineering works.—Sealed 31st May—6 months for enrolment.

Henry Wilkinson, of Pall Mall, gun-maker, for improvements in unloading shipping, especially those vessels called colliers.—Sealed 31st May—6 months for enrolment.

Louis Nicolas de Meckenheim, of Vienna, but now of London, engineer, for improvements in the manufacture of iron.—Sealed 31st May—6 months for enrolment.

Henry Beaumont Leeson, of Greenwich, Doctor of Medicine, for improvements in the art of depositing and manufacturing metals, and metal articles, by electro galvanic agency, and in the apparatus connected therewith.—Sealed 1st June—6 months for enrolment.

William Henry Kempton, of South-street, Pentonville, Gent., for improvements in the manufacture of candles.—Sealed 1st June—6 months for enrolment.

James Reed, of Bishops' Stortford, statuary and mason, for improvements in tiles, slating, and the construction of water-tight joints, and in the covering and casing of buildings and other erections.—Sealed 2nd June—6 months for inrolment.

Henry Jubber, of Oxford, confectioner, for certain improvements in kitchen ranges and apparatus for cooking.—Sealed 2nd June—6 months for inrolment.

Benjamin Aingworth, of Birmingham, Gent., for certain improvements in the manufacture of glass, for the purpose of producing glass, which may be used for the purposes to which plate-glass and window glass are usually applied.—Sealed 4th June—6 months for inrolment.

Edmund Tuck, of the Haymarket, Westminster, silversmith, for certain improvements in the covering or plating with silver, various metals and metallic alloys.—Sealed 4th June—6 months for inrolment.

William Irving, of Regent-street, Lambeth, for an improved corn drill, or machine for sowing all kinds of seed or grain.—Sealed 7th June—6 months for inrolment.

John Woodcock, of Manchester, millwright, for certain improvements in the construction of steam-engines.—Sealed 7th June—6 months for inrolment.

James Nasmyth, of Patricroft, near Manchester, engineer, for certain improvements in machinery or apparatus for forging, stamping, and cutting iron and other substances.—Sealed 9th June—6 months for inrolment.

Charles Searle, of Bath, Gent., for improved preparations of tea, coffee, cocoa, and milk.—Sealed 9th June—6 months for inrolment.

Joseph Chatwin, of Birmingham, lamp maker, for certain improvements in the construction of cocks.—Sealed 9th June—6 months for inrolment.

John George Hughes, of 158, Strand, general agent, for a new

application of telegraphic signals, and the mode of applying the same.—Sealed 9th June—6 months for enrolment.

James Anthony Emslie, of Newcastle-upon-Tyne, civil engineer, for certain improvements in pumps.—Sealed 9th June—6 months for enrolment.

Stephen Bencraft, of Barnstaple, Gent., for improvements in the construction of saddle-trees.—Sealed 9th June—6 months for enrolment.

Arthur Howe Holdsworth, of Brook Hill, Devon, Gent., for improvements in constructing certain parts of ships and vessels, in order to arrest the progress of fire, and for regulating temperature.—Sealed 11th June—6 months for enrolment.

Richard Garrett, of Leiston Works, Suffolk, agricultural implement manufacturer, for improvements in the construction of horse-hoes, scarifiers, drag-rakes, and drills, for cultivating land.—Sealed 13th June—6 months for enrolment.

Thomas Banks, of Manchester, engineer, for certain improvements in the construction of wheels, and tyres of wheels, to be employed upon railways.—Sealed 13th June—6 months for enrolment.

Moses Poole, of Lincoln's Inn, Gent., for improvements in obtaining the colouring matter from wool and woollens, dyed with indigo,—being a communication.—Sealed 13th June—6 months for enrolment.

William Cotton, of Leytonstone, Essex, Gent., for an improved weighing machine.—Sealed 13th June—2 months for enrolment.

Daniel Williams, of Oxford, slater, for improvements in covering ridges and hips of the roofs of buildings.—Sealed 13th June—6 months for enrolment.

Isaac Moss, of Macclesfield, silk trimming manufacturer, for improvements in the manufacture of covered buttons, ornaments, and fastenings for wearing apparel.—Sealed 13th June—6 months for enrolment.

William Morrett Williams, of Fenchurch-street, lock manufacturer, for certain improvements in the construction of locks and keys, which he proposes to call "Williams' lock and key improved."—Sealed 13th June—6 months for enrolment.

Henry Hough Watson, of Bolton-le-Moors, consulting chemist, for certain improvements in bleaching, changing the colour of, and otherwise preparing, purifying, and refining tallow, and certain other organic substances, mixtures, compounds, and manufactures.—Sealed 21st June—6 months for enrolment.

Joseph Bunnett, of Deptford, engineer, for certain improvements in pavements for streets, roads, and other surfaces, and in machinery for producing and repairing the same.—Sealed 21st June—6 months for enrolment.

John Dickson, of Brook-street, Holborn, engineer, for improvements in rotatory engines and boilers, in stopping railway carriages, and in machinery for propelling vessels; part of which improvements are applicable to propelling air and gases.—Sealed 21st June—6 months for enrolment.

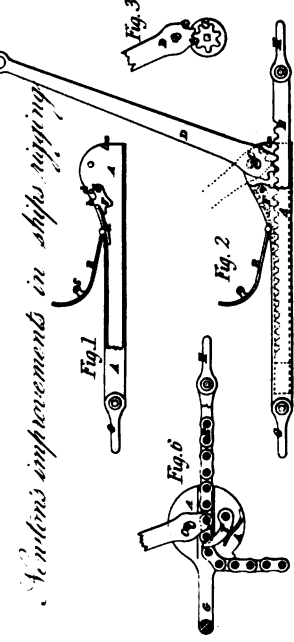
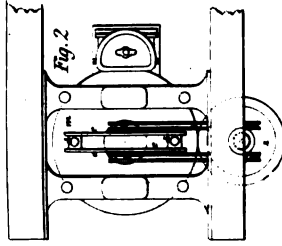
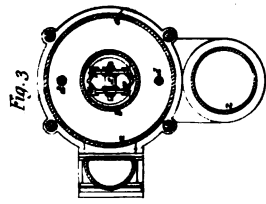
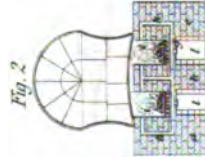
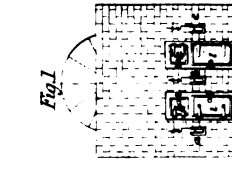
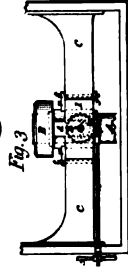
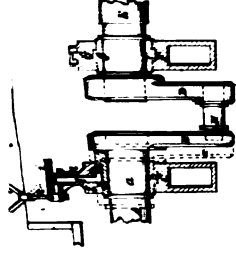
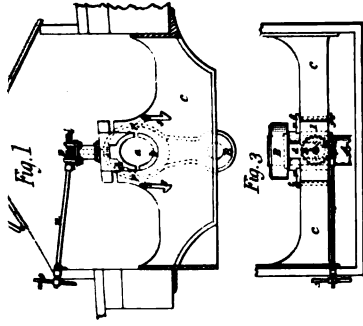
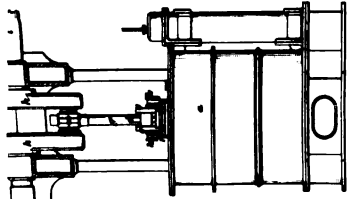
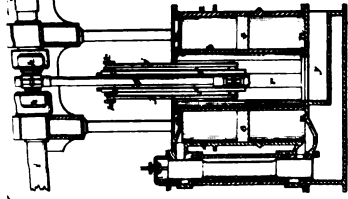
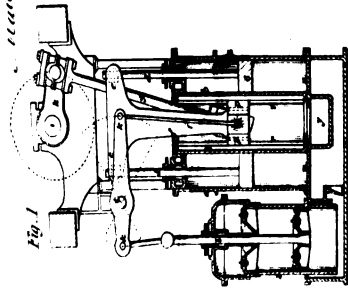
Frederick Gye, Jun., of South Lambeth, Surrey, Gent., for improvements in binding pamphlets, papers, and other documents.—Sealed 21st June—6 months for enrolment.

Thomas Gaunt, of Dolby-terrace, City-road, Gent., for improvements in the means of applying any such power as is or may be used for propelling vessels or carriages, to produce locomotion thereof.—Sealed 21st June—6 months for enrolment.

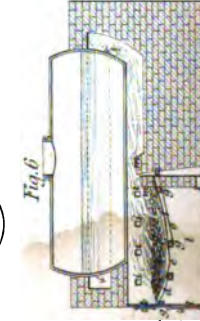
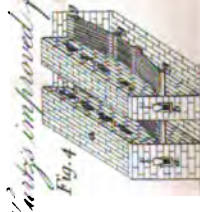
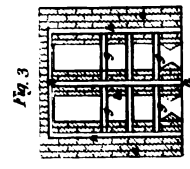
Henry Bewley, of Dublin, licentiate apothecary and chemist, for an improved Chalybeate water.—Sealed 23rd June—6 months for enrolment.

CELESTIAL PHENOMENA FOR JULY, 1842.

D. H. M.		D. H. M.	
1	Clock after the sun 3m. 22a.	—	Venus R. A. 10h. 18m. dec.
—	☽ rises 11h. 25m. A.	7. N.	
—	☽ passes mer. 6h. 0m. M.	—	Mars R. A. 7h. 24m. dec.
—	☽ sets 1h. 6m. A.	55. N.	
3 5	☉ in Apogee.	—	Vesta R. A. 6h. 37m. dec.
13 20	Her. stationary	6. N.	
5	Clock after the sun 4m. 17s.	—	Juno R. A. 15h. 47m. dec.
—	☽ rises 1h. 29m. M.	49. S.	
—	☽ passes mer. 10h. 15m. M.	—	Pallas R. A. 4h. 4m. dec.
—	☽ sets 7h. 2m. A.	56. S.	
7 13 35	☿'s first satt. will im.	—	Ceres R. A. 5h. 55m. dec.
7	Partial Eclipse of the Sun.	8. N.	
16 53	Begins.	—	Jupiter R. A. 19h. 11m. dec.
17 46	Greatest Phase.	42. S.	
18 43	Ends.	—	Saturn R. A. 18h. 42m. dec.
	Magnitude of Eclipse (Sun's	34. S.	
	diameter=1) 0.801, on the	—	Georg. R. A. 23h. 54m. dec.
	Southern Limb.	25. S.	
12 43	♂ in conj. with the ☽ diff. of	—	Mercury passes mer. 22h. 5m.
	dec. 0. 4 N.	—	Venus passes mer. 2h. 26m.
19 42	♂ in conj. with the ☽ diff. of dec.	—	Mars passes mer. 23h. 34m.
	5. 11. S.	—	Jupiter passes mer. 11h. 18m.
8 7 1	Ecliptic conj. or ☉ new moon.	—	Saturn passes mer. 10h. 49m.
8 10 45	♂ in infr. conj. with the ☉	—	Georg. passes mer. 16h. 0m.
9 19	☽ in Perigee.	21	☽ eclipsed, invis. at Greenwich
10	Clock before the sun, 4m. 55s.	22 10 57	Ecliptic oppo. or ☉ full moon
—	☽ rises 6h. 44m. M.	—	Occul ♄ Capricorni, im. 12h
—	☽ passes mer. 2h. 12m. A.	34m.	
—	☽ sets 9h. 20m. A.	23	Juno stationary
29	☿ in oppo. to the ☉	23 14 8	☿'s first satt. will em.
6 7	♀ in conj. with the ☽ diff. of dec.	24 13 50	☿'s second satt will em.
	4. 39. N.	—	Occul ♄ Aquarii, im. 15h. 28m
23 26	♀ in conj. with ♂ diff. of dec.	em. 16h. 34m.	
	5. 20. S.	25	Clock before the sun, 6m. 9s.
12	Occul ♄ Leonis, im. 7h. 37m. em.	—	☽ rises, 8h. 50m. A.
	8h. 34m.	—	☽ passes mer. 1h. 56m. M.
14 10 5	☽ in ☐ or first quarter.	—	☽ sets, 7h. 27m. M.
15	Clock before the sun, 5m. 33s.	8 37	☿'s first satt. will em.
—	☽ rises, 1h. 48m. A.	9	☽ in Apogee.
—	☽ passes mer. 6h. 25m. A.	27	Occul ♄ Piscium, im. 14h. 54m
—	☽ sets 10h. 53m. A.	em. 16h. 15m.	
16 12 14	☿'s first satt. will im.	27 2 46	Her. in conj. with the ☽ diff. of
17 11 15	☿'s second satt. will em.	dec. 6. 16. S.	
17 18 9	♂ greatest Hel. Lat. S.	9 54	☿'s fourth satt. will im.
—	Occul Scorpii, im. 8h. 6m. em.	13 21	☿'s fourth satt. will em.
	9h. 21m.	29 3 35	♂ greatest Elong. 19. 28. W.
19 5 34	♂ stationary	30 2 42	☽ in ☐ or last quarter
20	Clock before the sun, 5m. 58s.	30 9 40	Ceres in the ascending node
—	☽ rises 7h. 7m. A.	—	Occul ♄ in Arietis, im. 11h.
—	☽ passes mer. 10h. 54m. A.	32m. em. 12h. 23m.	
—	☽ sets 1h. 39m. M.	31	Occul ♄ in Tauri, im. 12h. 14m
—	Mercury R. A. 6h. 50m. dec.	em 12h. 55m.	
	18. 55. N.		



Antoni's improvements in ship rigging



Karby's improved furnaces

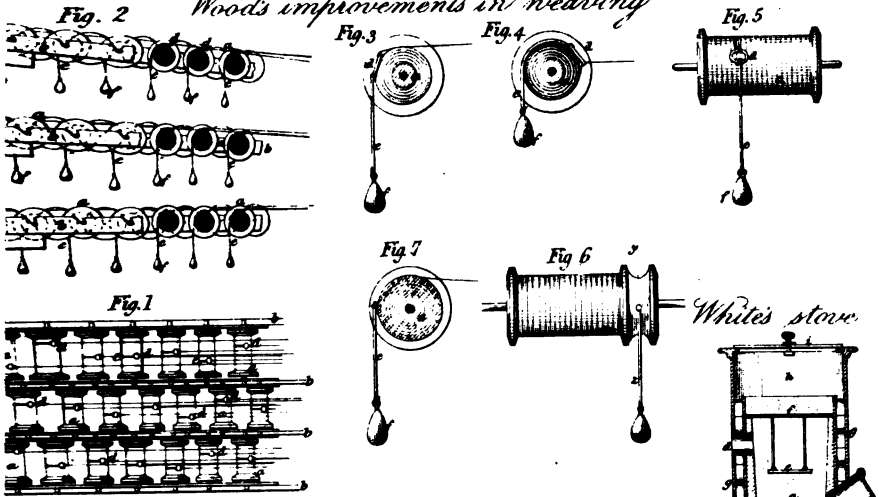
Green Dal:

February 2nd 1842.

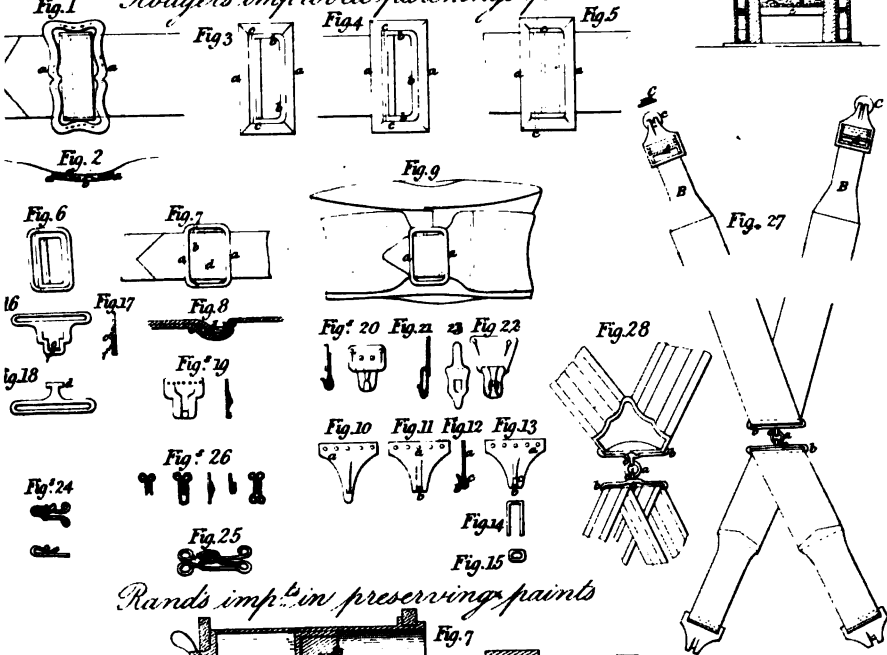
G. Gledwin Sculp.



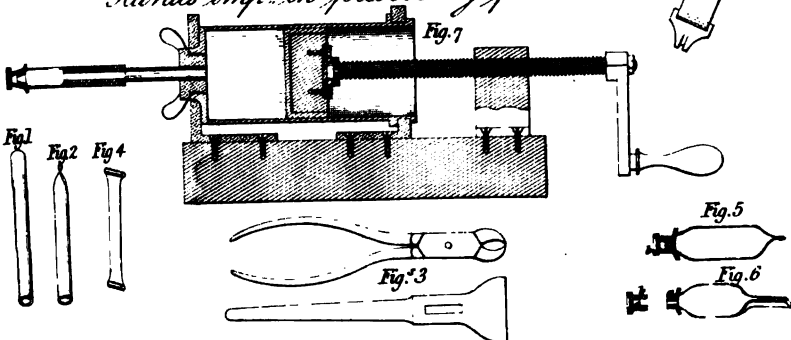
Woods improvements in rearing



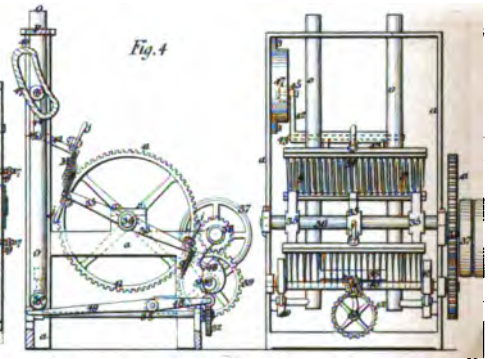
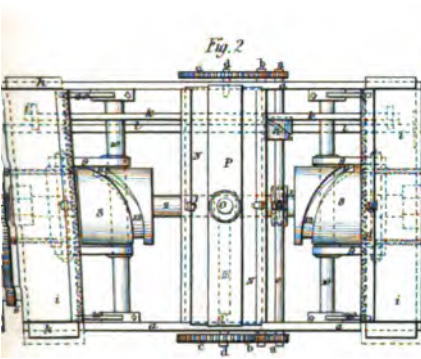
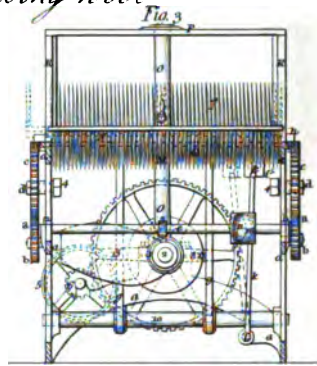
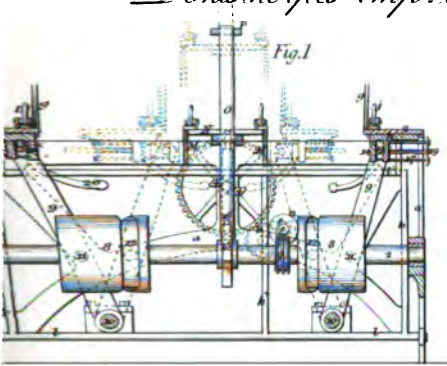
Rodgers' improved fastenings for dress



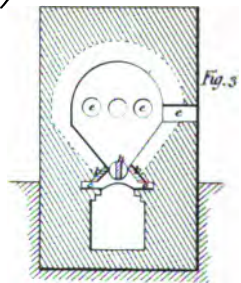
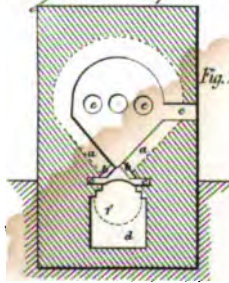
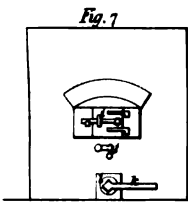
Rands imp. in preserving paints



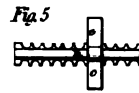
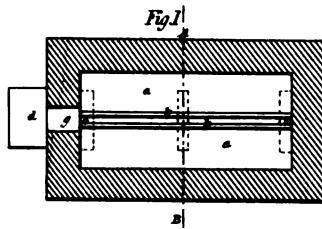
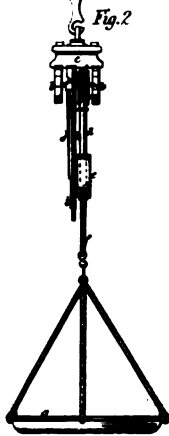
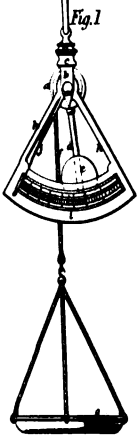
Donisthorpe's impro'd in combing wool

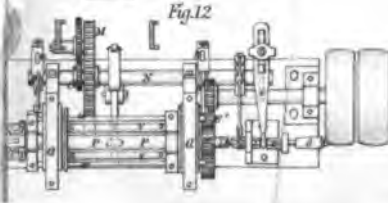
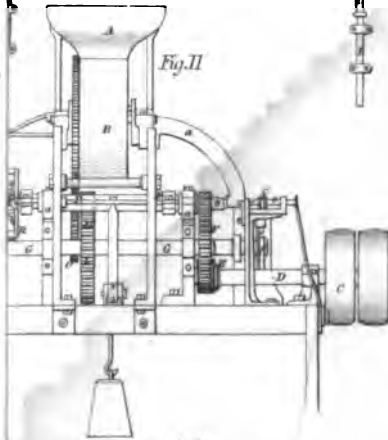
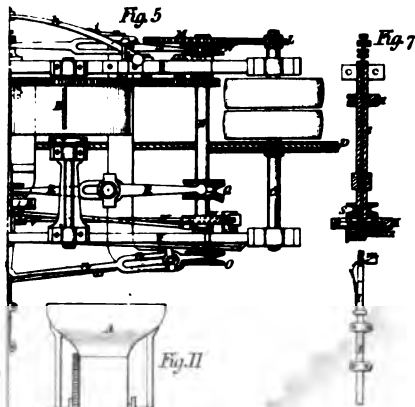
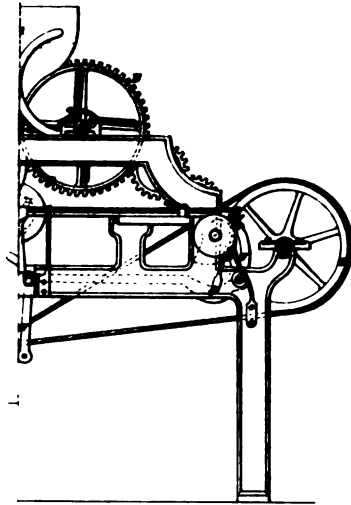


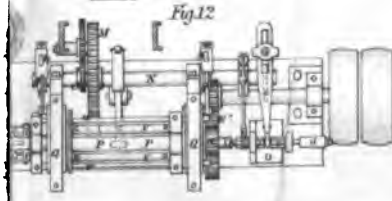
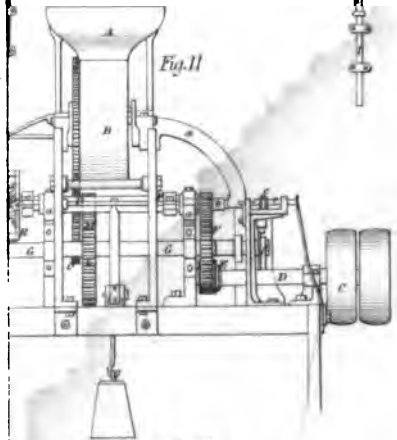
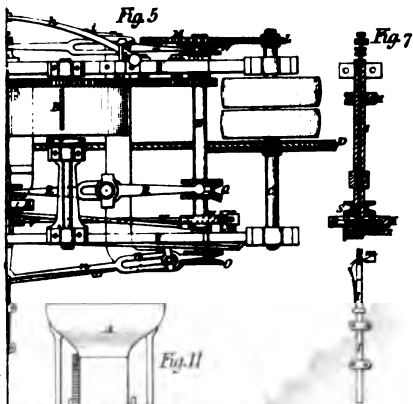
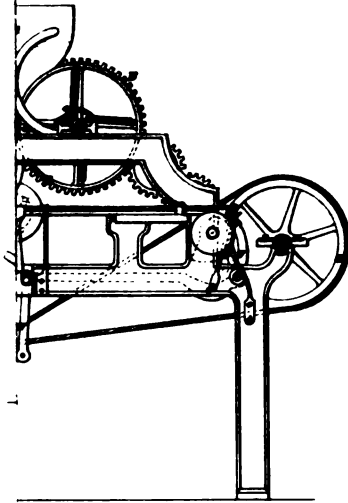
Heindrykx's improved furnaces



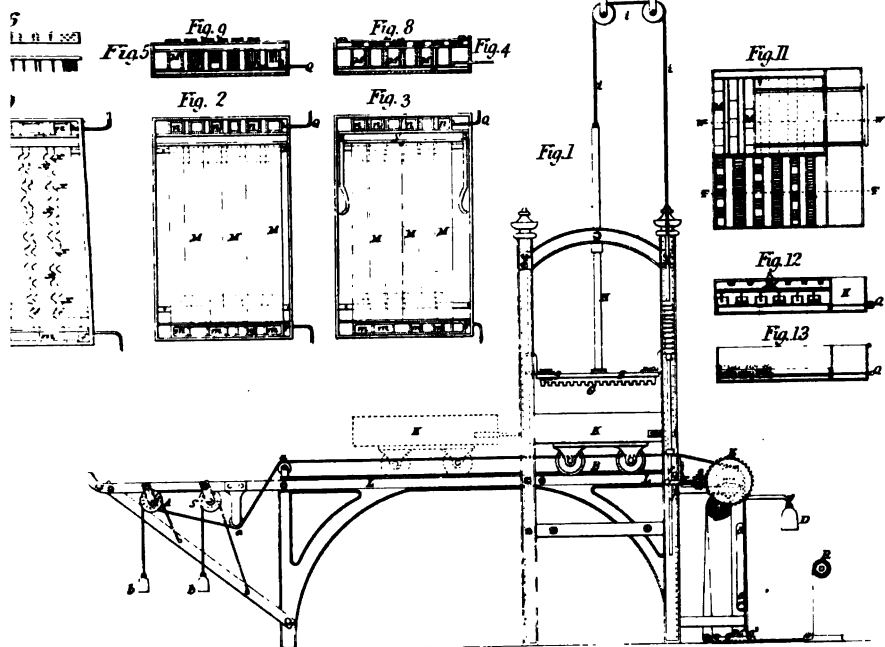
Newton's weighing app.^{ts}



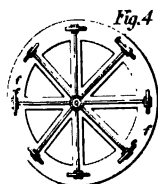
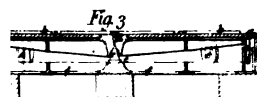
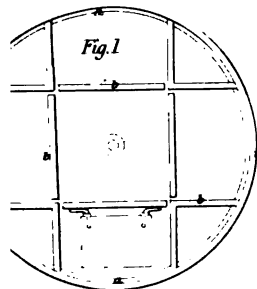




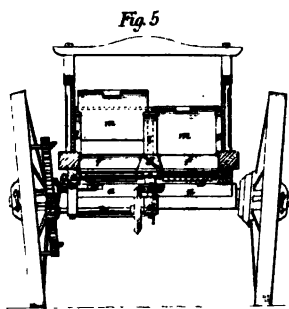
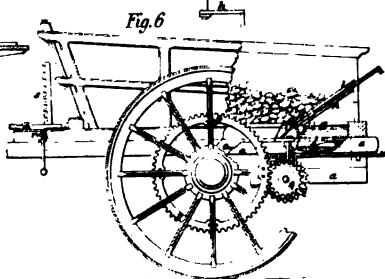
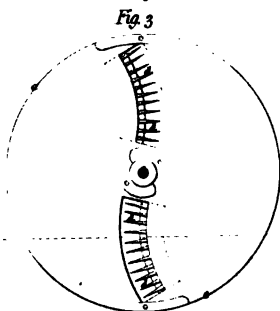
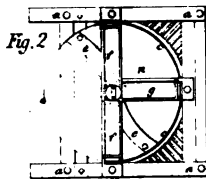
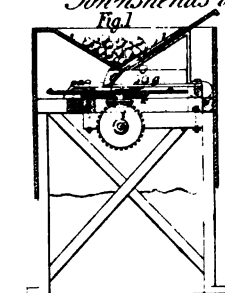
Hampson's improvements in block printing



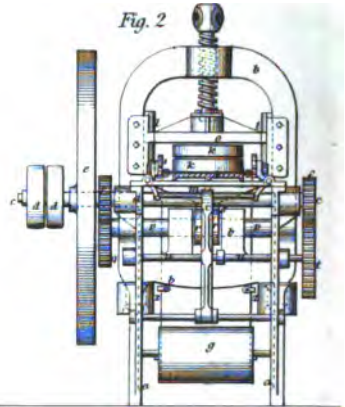
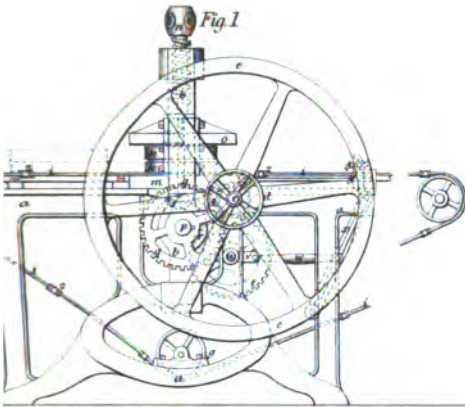
Turns turn table



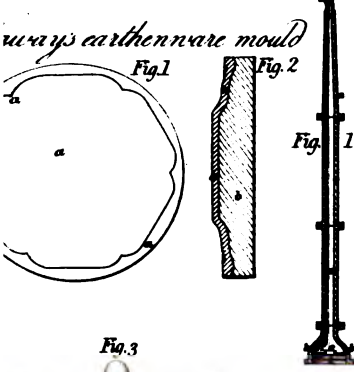
Jonshends improved turnip cutter



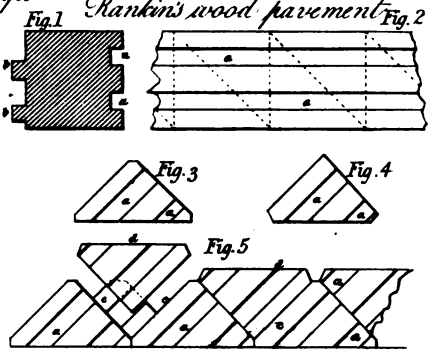
Ridgway & Malls imp^{ts} in the manufacture of china &c.



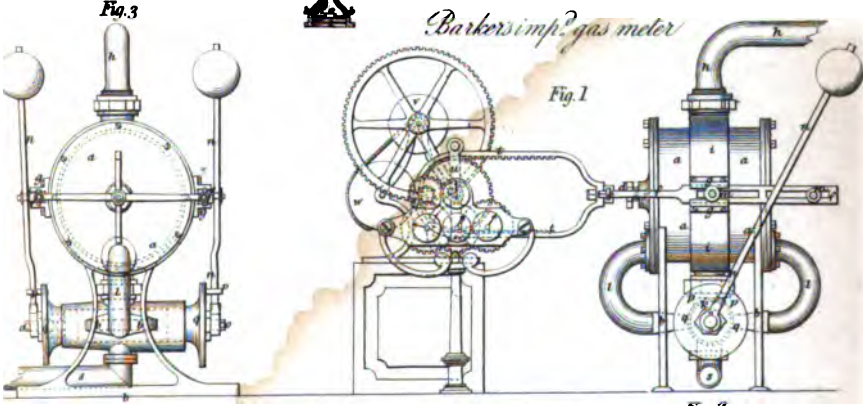
Walker's hydraulic app^{ts}



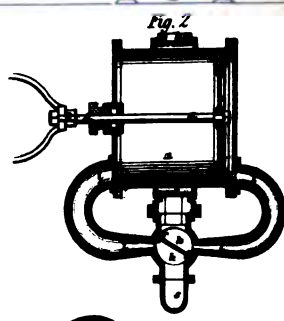
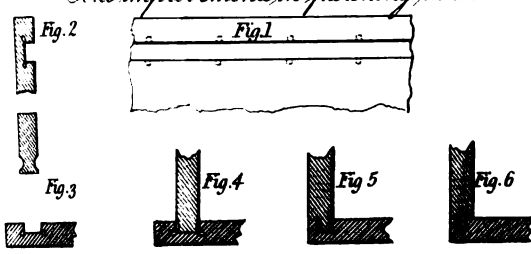
Rankin's wood pavement

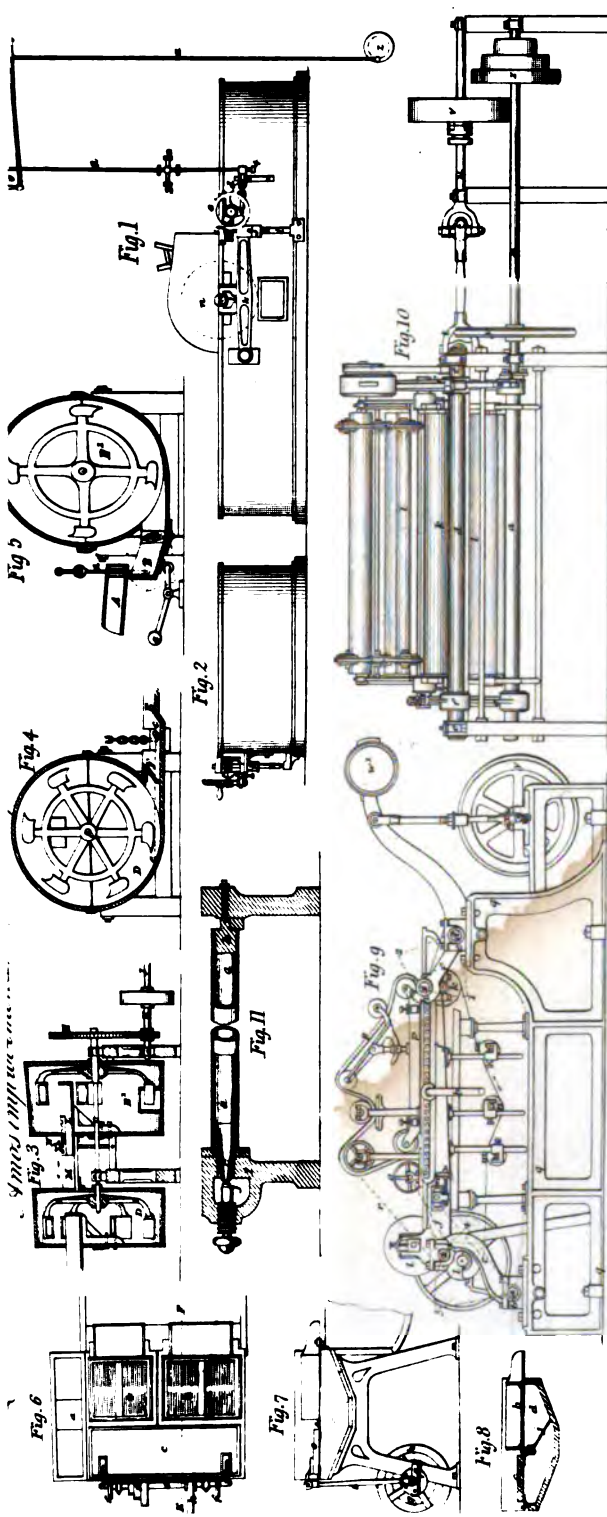


Barker's imp^{ts} gas meter

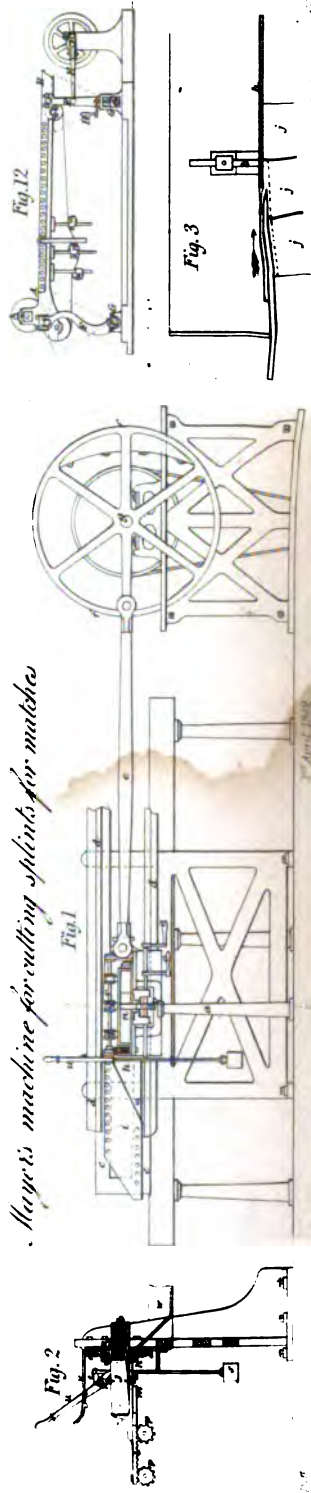


Coles' improvements in fastening tanks





Hayes's machine for cutting splints for matches





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Wells' braiding machinery

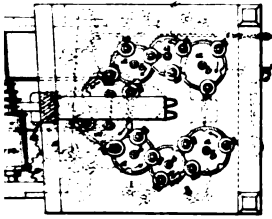
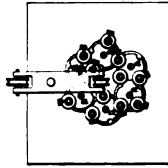


Fig. 4



McMurray's pulp strainer

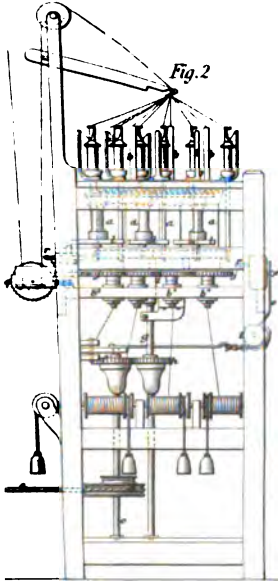
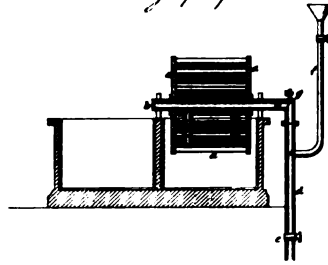


Fig. 2

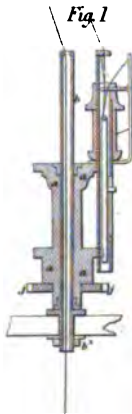


Fig. 1

Eagles' motive power Fig. 1

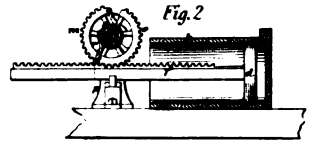
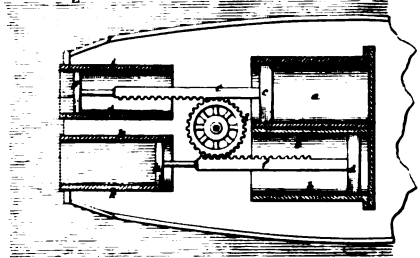


Fig. 2

Ridgway & Wall's imp^{ts} in the manufacture of earthenware

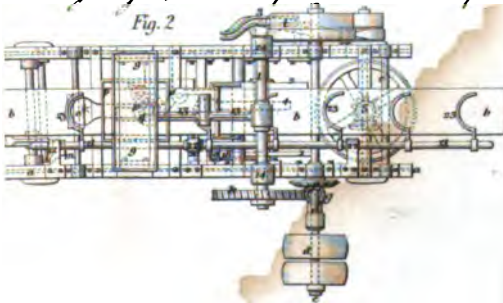


Fig. 2

Fig. 6



Fig. 4



Fig. 5

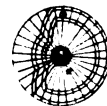


Fig. 3

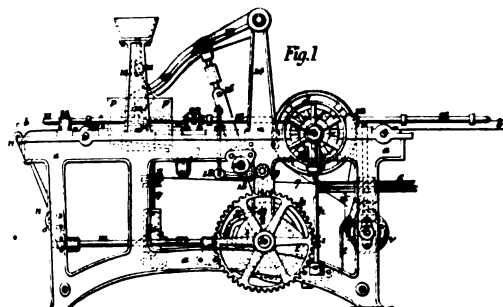
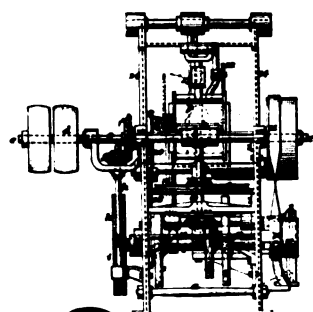
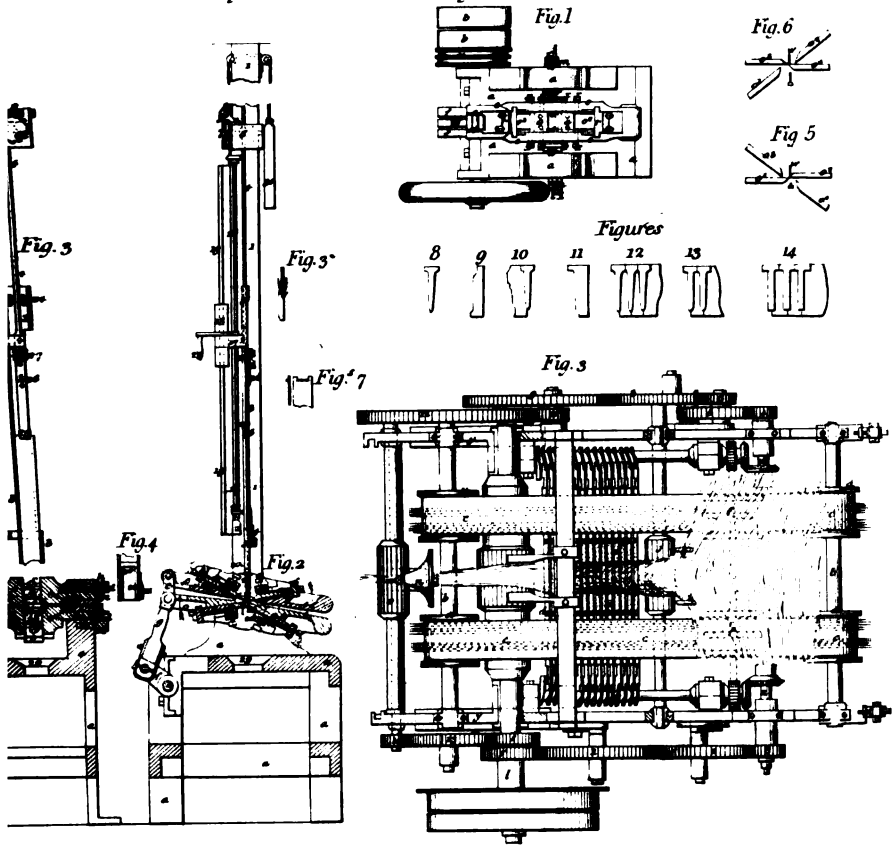


Fig. 1

Berry's imp.^t in making nails & brads



CONJOINED SERIES
Chapman's new type machine for setting up types

PLATE X

Fig. 6

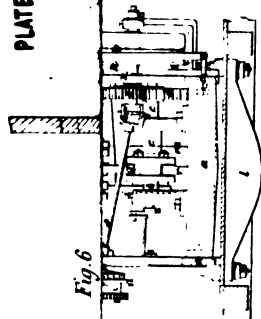
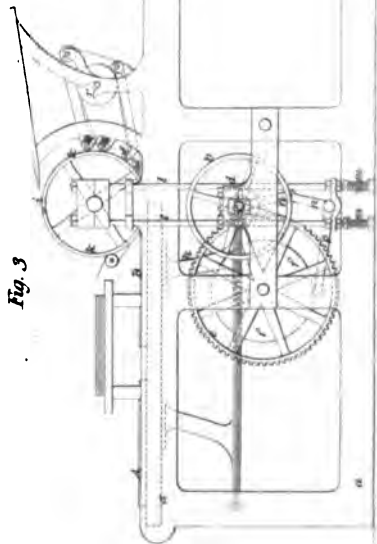


Fig. 3



Nov 17 1892

Patented

Nov 17 1892

Nov 17 1892

Means employed for running

Fig. 2

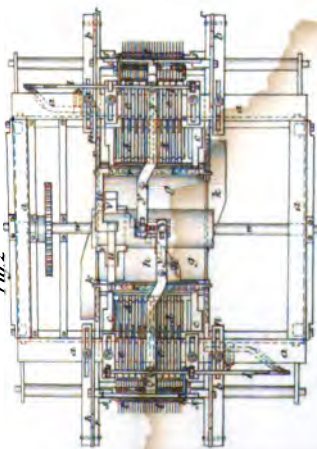


Fig. 5



Fig. 4



Fig. 6

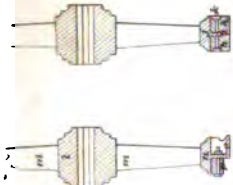
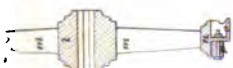


Fig. 3

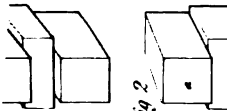
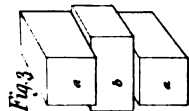


Fig. 2



Calculus imp. in paring

Fig. 1



Fig. 3



Fig. 2

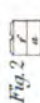


Fig. 5



Fig. 4



Trans. manufacture of gelatine

Fig. 2

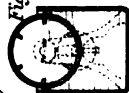
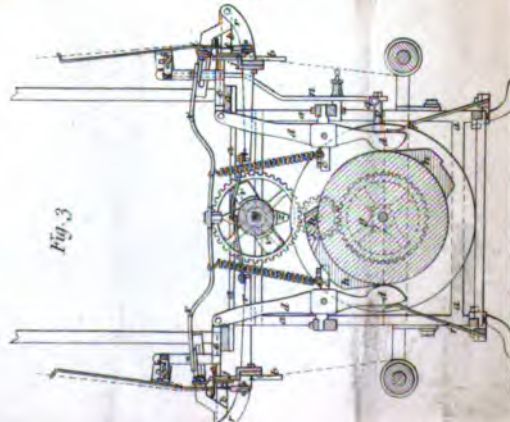


Fig. 3



Means imp. in paring &c

Fig. 3



Fig. 4

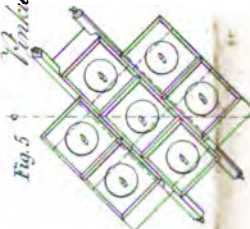


Fig. 2



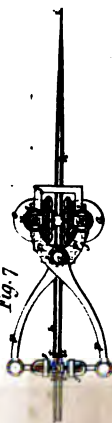
Fig. 1

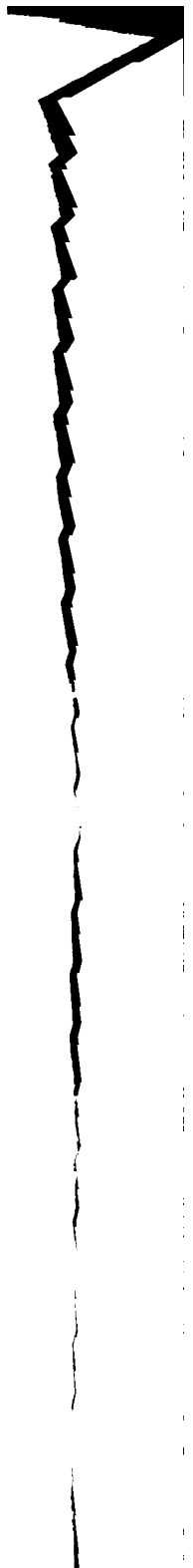


Fig. 7



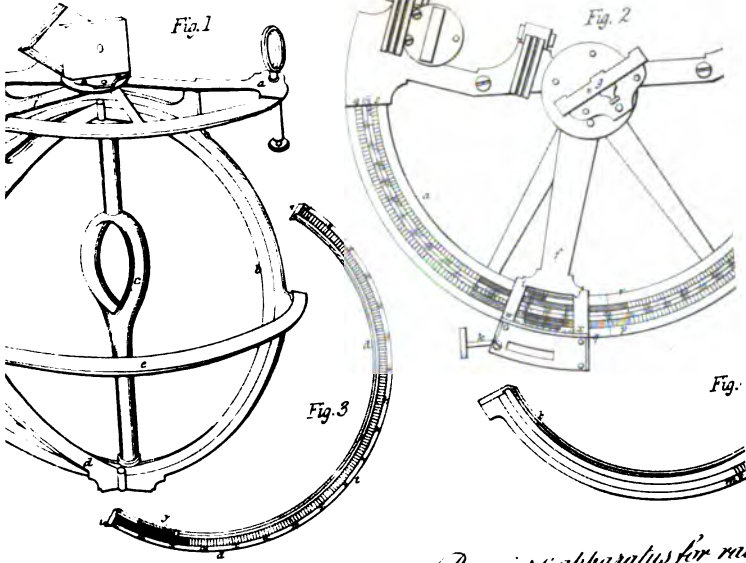
Fig. 6



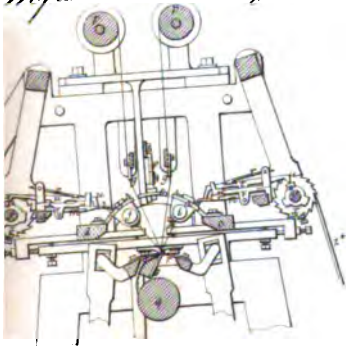


CONJOINED SERIES

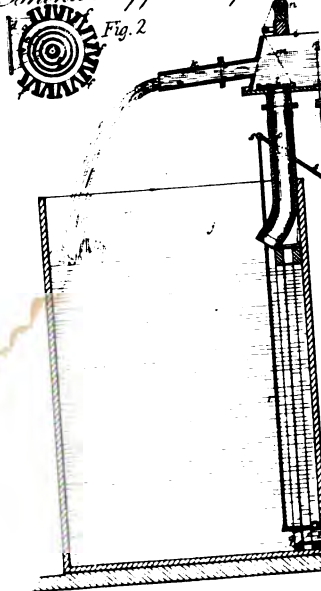
Taylor's improvements in measuring angles



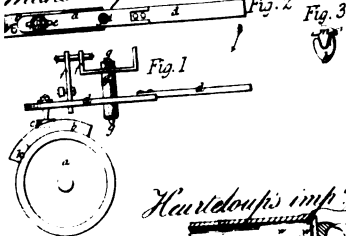
Proff's lace machinery



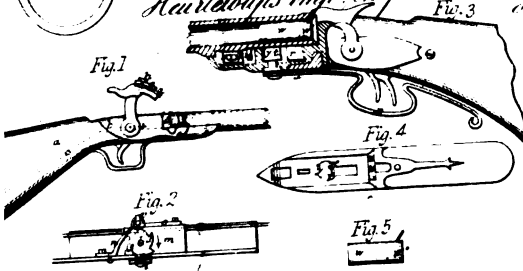
Brunier's apparatus for measuring



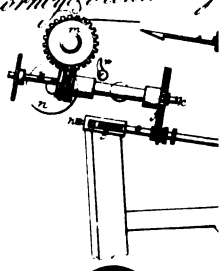
Smith's improvements in weaving



Hurst & Co's imp in fire arms



Hornby & Kennworthy

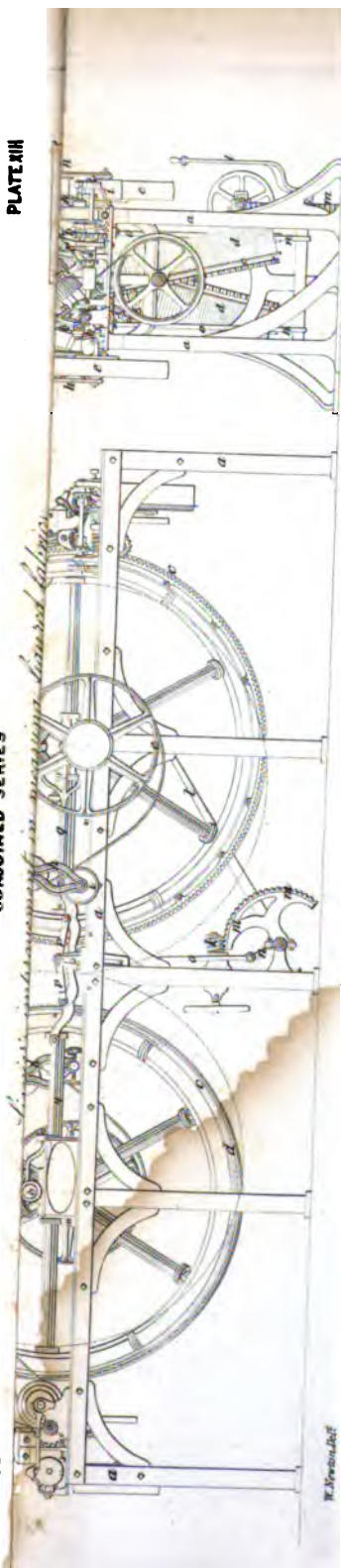




VOL. IX

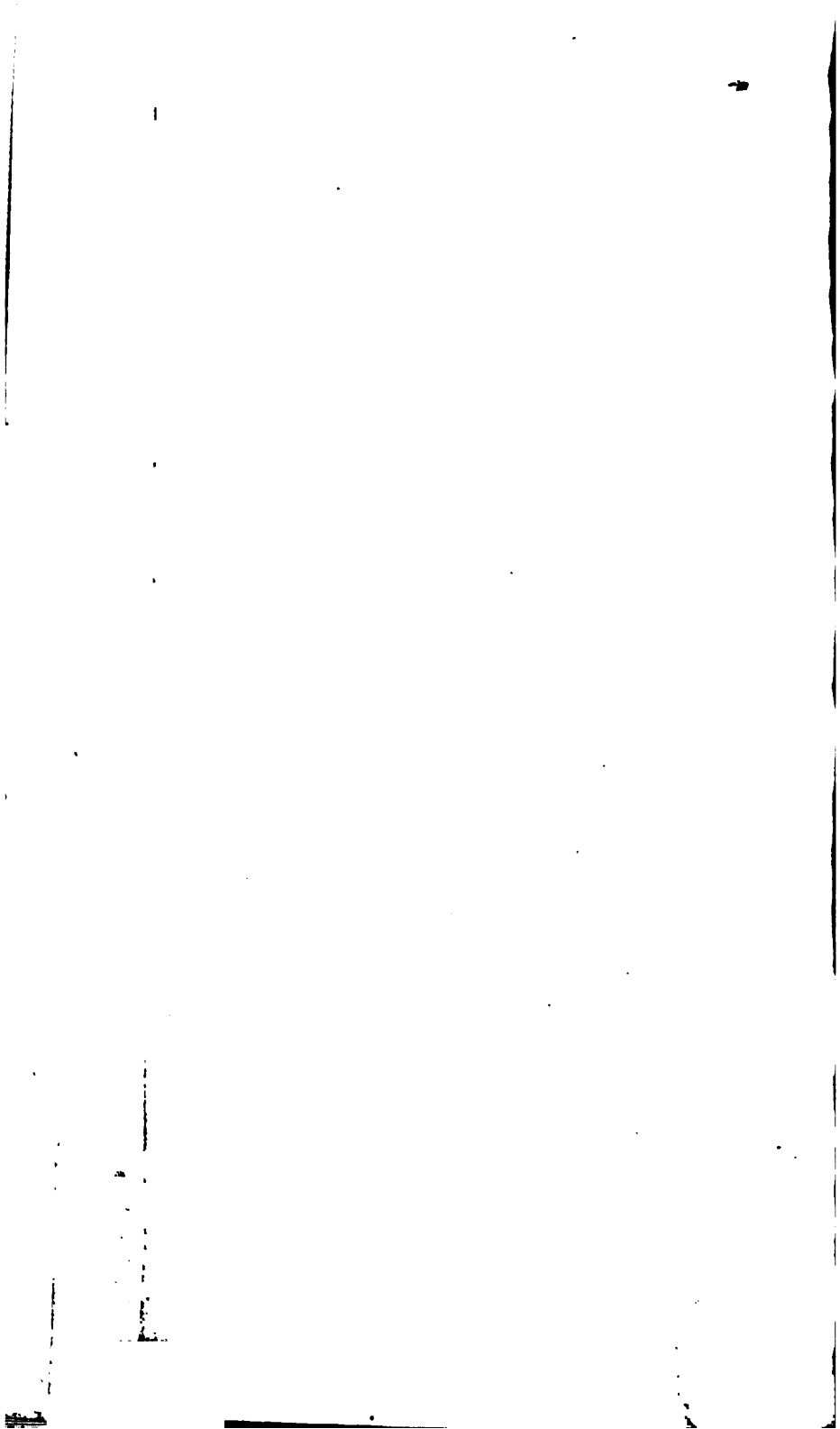
CONJOINED SERIES

PLATE III

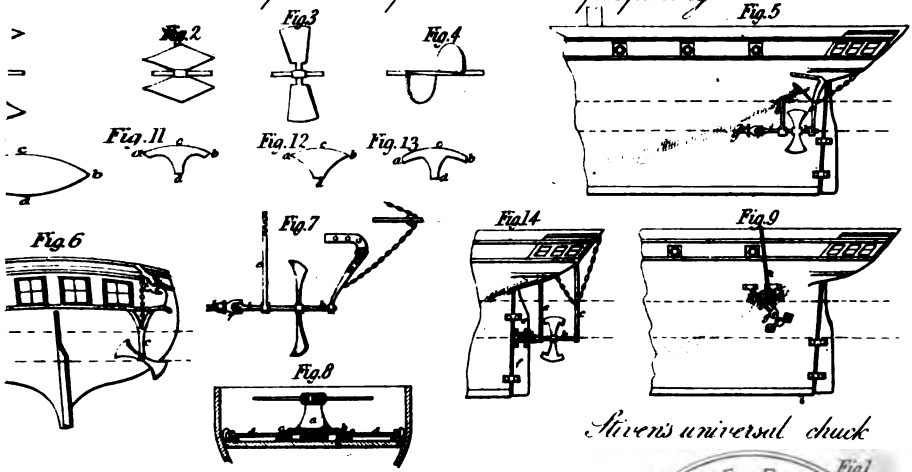


See Vol. IX

W. A. H. 1847

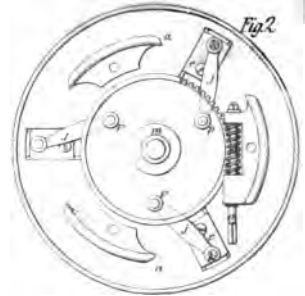
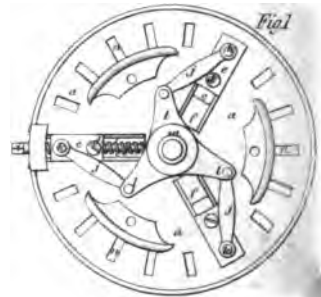
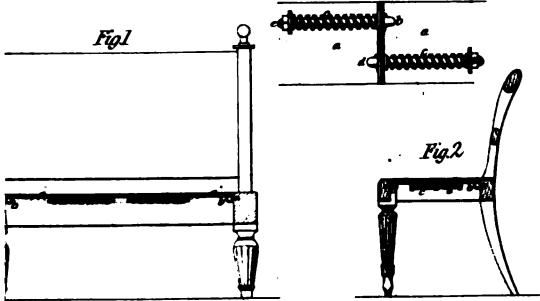


Carpenters improvements in propelling

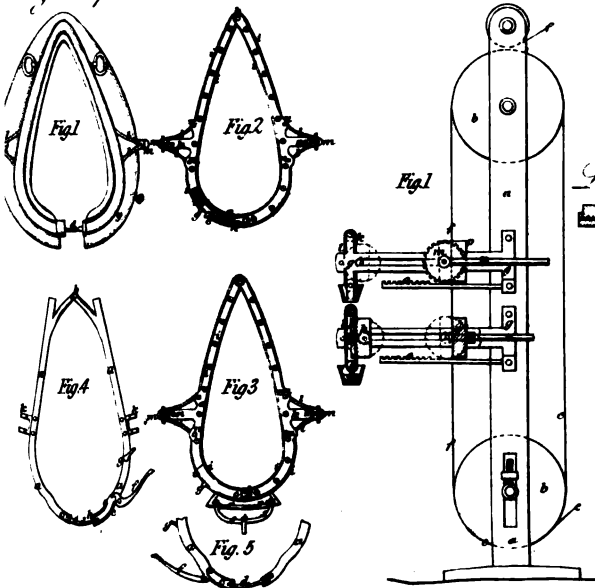


Stevens universal chuck

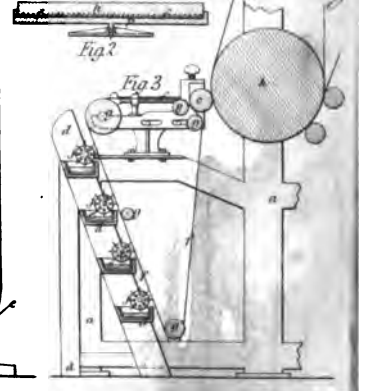
Wilke & Schuivens elastic seat



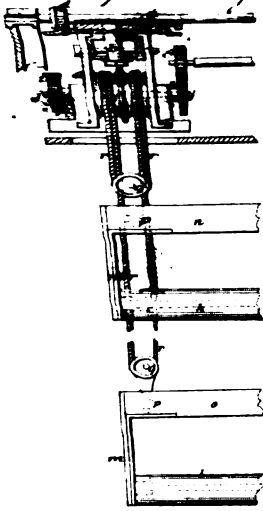
Days improved horse collar



Leess' improvement in calico printing



Went's imp^t in drying cotton &c



Gold's apparatus for grinding

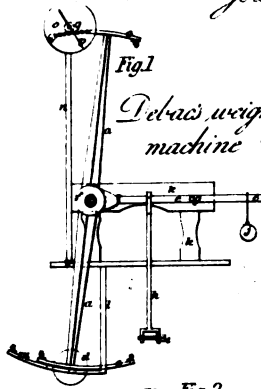
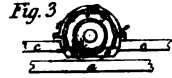


Fig. 1

Delac's weighing machine

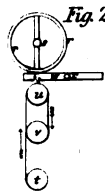


Fig. 2

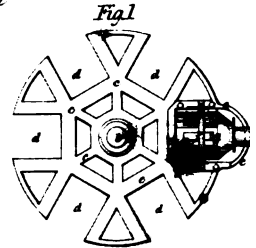


Fig. 1

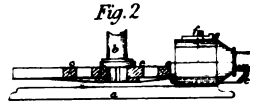


Fig. 2

Hales' improved wind mill

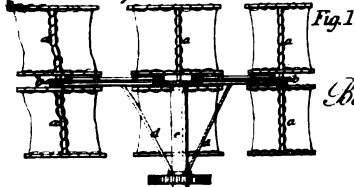


Fig. 1

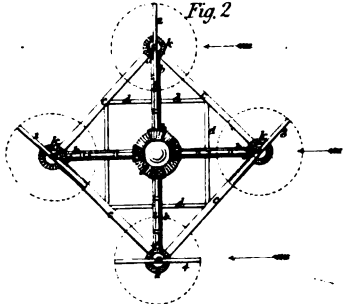


Fig. 2

Barton & Vye's imp^t in pumps

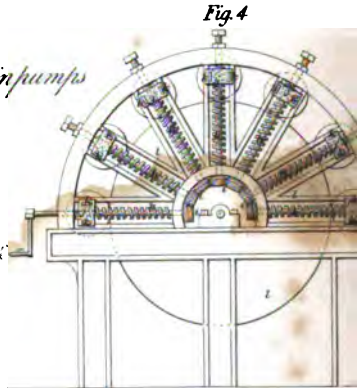


Fig. 4

Pudders' imp^t lace machinery

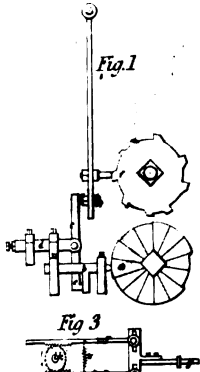


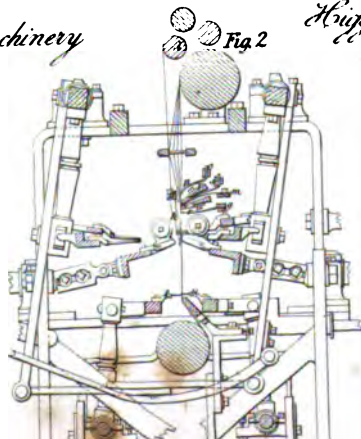
Fig. 1



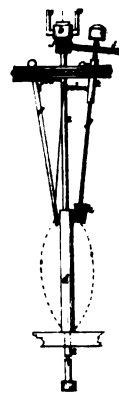
Fig. 3

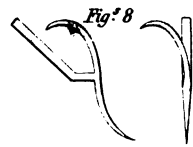
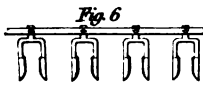
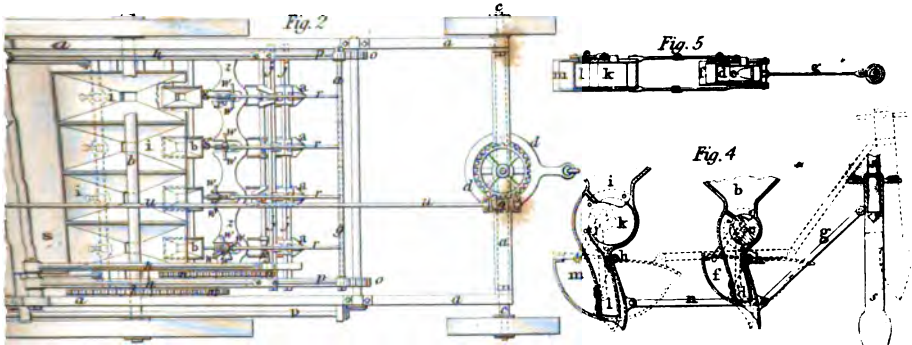
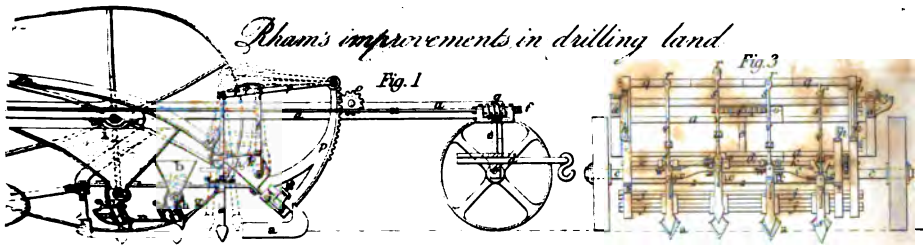


Fig. 2

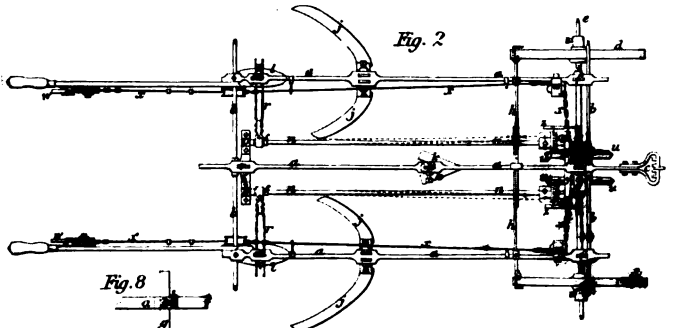
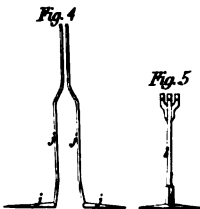
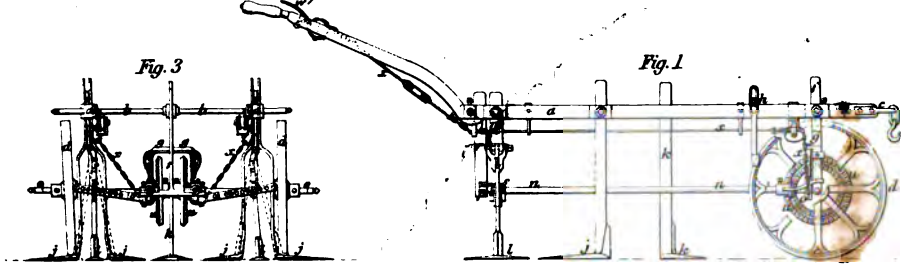


Higgins' imp^t in spinn

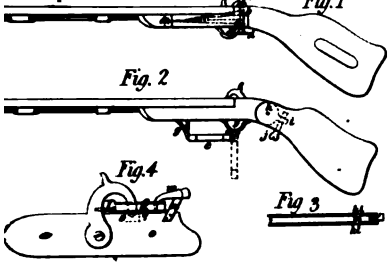




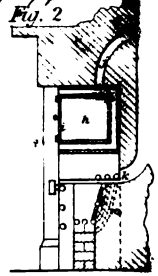
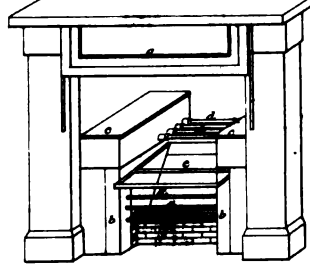
White's improved horse hoe



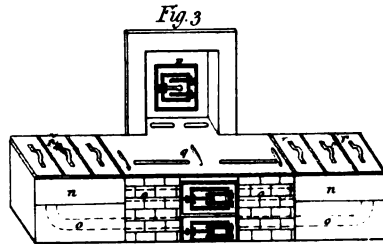
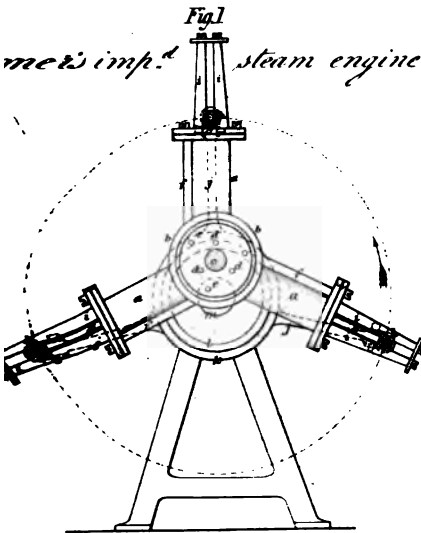
2 1/2 nels imp^d in fire arms



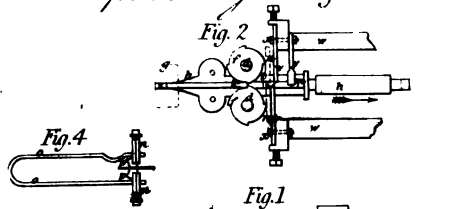
Weeks' imp^d cooking apparatus



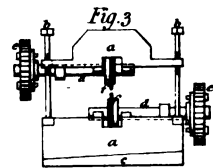
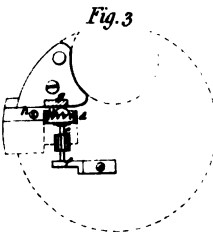
meis imp^d steam engine



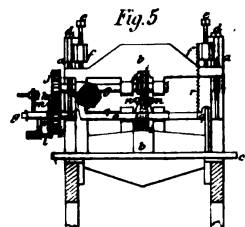
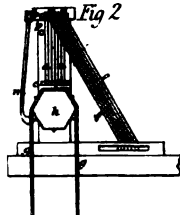
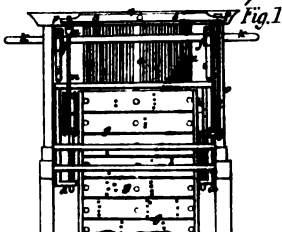
Cordis' improved mach^y for making nails & screw-blans



Littlenworth's imp^d in watches and clocks



Molinard's imp^d in looms





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•

•

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Brake improvements in rotary steam engines



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7

Hydroni imp. in railway

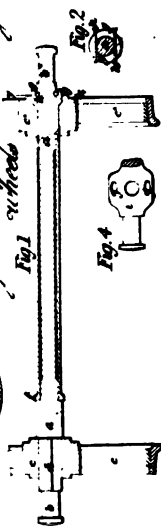


Fig. 1

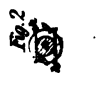


Fig. 2



Fig. 3

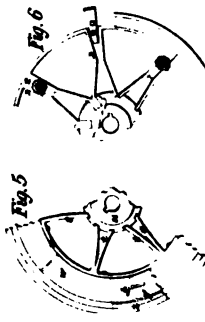


Fig. 4

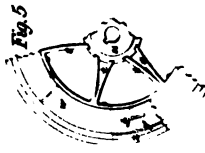


Fig. 5

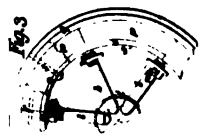


Fig. 6

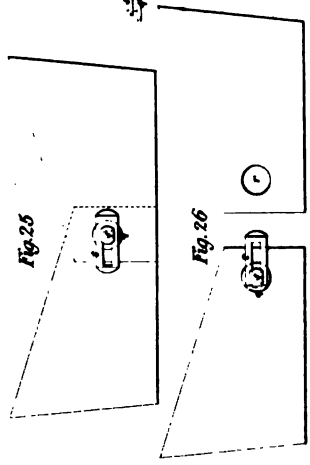


Fig. 25

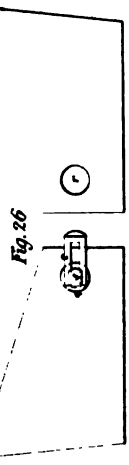


Fig. 26



Fig. 27



Fig. 24

W.A. Beaver, Sculpt.

July 24 1842

W. Emerson, Draft







